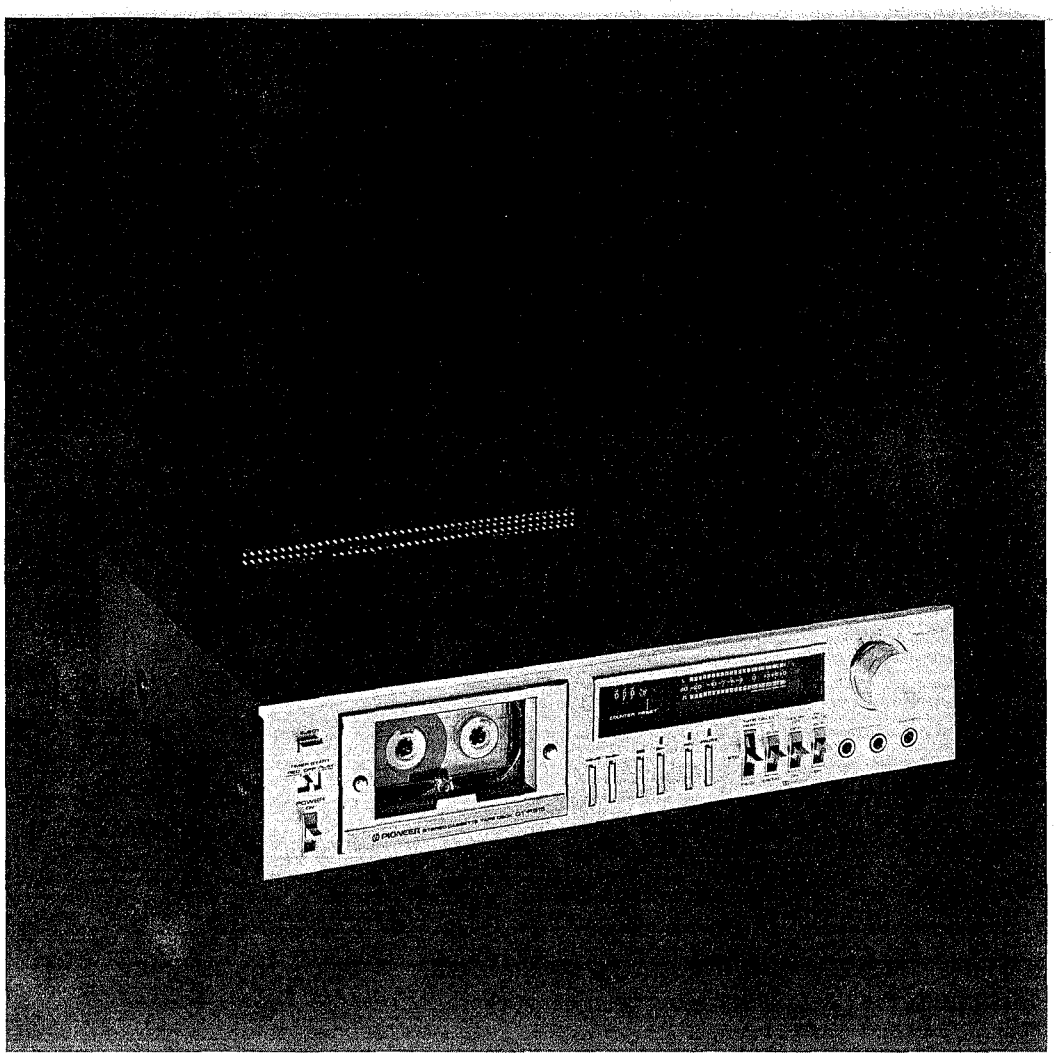

Service Manual

CASSETTE TAPE DECK

CT-F615

PIONEER®

MODEL CT-F615 COMES IN ONE VERSION DISTINGUISHED AS FOLLOWS.

Type	Voltage	Remarks
KU	120V only	U.S.A. model

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NOTE;

- **This service manual is applicable to the CT-F615/KU type which serial numbers from ZL3600001 through ZL3600100.**
- **As an improvement, the mother assembly was modified of which serial numbers are after ZL3600101. For detailed, refer to the additional service manual on page 45.**

1. SPECIFICATIONS

Systems . . . . . Compact cassette, 2-channel stereo
Motor . . . . . DC servo motor x 1
Heads . . . . . "Sendust" recording/playback head x 1
Erasing head x 1
Fast Winding Time . . . . . Approximately 100 seconds (C-60 tape)
Wow and Flutter . . . . . No more than 0.06% (WRMS)
Frequency Response
Standard, LH tapes . . . . . 20 to 15,000Hz (25 to 14,000Hz ± 3dB)
Ferrichrome tape . . . . . 20 to 17,000Hz (25 to 16,000Hz ± 3dB)
Chromium dioxide tape . . . . . 20 to 17,000Hz (25 to 16,000Hz ± 3dB)
Metal tape . . . . . 20 to 18,000Hz (25 to 17,000Hz ± 3dB)
Signal-to-Noise Ratio . . . . . Dolby NR OFF; More than 58dB
Dolby NR ON; More than 68dB (over 5kHz)
Harmonic Distortion . . . . . No more than 1.3% (0dB)
Input (Sensitivity/Maximum allowable input/Impedance)
MIC (L, R); 0.3mV/100mV/10 kilohms, 6mm diam, jack
(Reference MIC impedance; 250 ohms to 10 kilohms)
LINE x 2; 50mV/25V/75 kilohms Pin jack
Output (Reference level/Load impedance)
LINE x 2; 450mV/50 kilohms Pin jack
HEADPHONES x 1; 73mV/8 ohms, 6mm diam. jack
Semiconductors
Amplifier Section . . . . . Transistor x 55
Diodes x 45 (Zener x 3, LED x 3), ICs x 5
Motor control Section . . . . . Transistor x 2, Diode x 1
Subfunctions

- Air damp eject function
- Fluorescent display level meter (–20 to +8dB)
- 4 position tape selector (STD/Fe-Cr/CrO_2/METAL)
- IC logic control
- Dolby NR system (ON/OFF)
- Standby mechanism with unattended recording
- REC muting function
- Full automatic stop mechanism

Power Requirements AC120V, 60Hz
Power Consumption . . . . . 31 watts
Dimensions . . . . . 420(W) x 98(H) x 328(D)mm Max.
16-9/16 x 3-7/8 x 12-15/16in.
Weight . . . . . 6kg (13 lb 4oz)
Furnished Parts . . . . . Stereo connecting cords with pin plugs x 2
Head cleaning swabs x 3
Operating instructions x 1

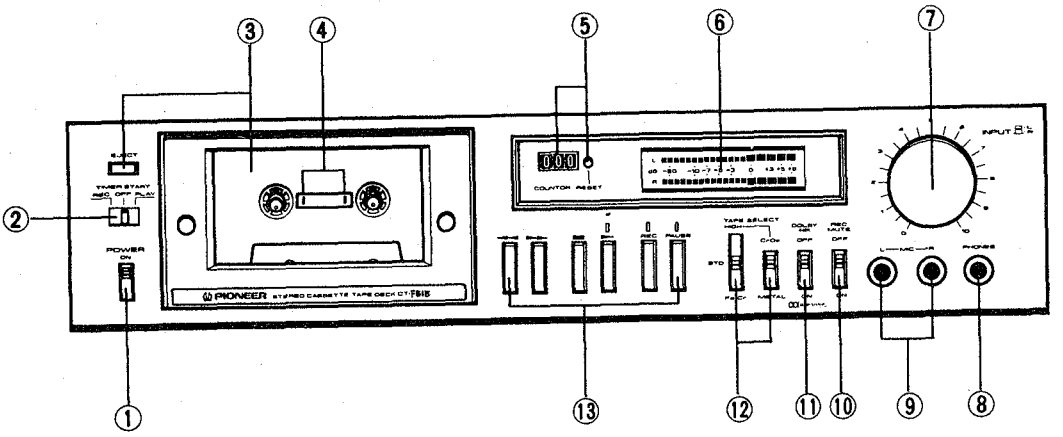
Note:
Specifications and the design subject to possible modification without notice due to improvements.

NOTES:

1. Reference Recording Level: Meter 0dB indicating level (160 nwb/m magnetic level = Philips cassette reference level)
2. Reference Signal: 333Hz
3. Wow & Flutter: • JIS [3kHz, with acoustic compensation (weighted), rms value]
4. Frequency Response: • Measured at –20dB level, DOLBY NR OFF, level deviation is ±6dB without indication.
5. Signal to Noise Ratio: • Measured at the third harmonic distortion 3% level, weighted.
6. Sensitivity: Input level (mV) required for reference recording level with input (REC) controls set to maximum.
7. Maximum Allowable Input: While decreasing settings of input (REC) level controls and increasing level at input jacks, this is the maximum input level (mV) at the point where recording amplifier output waveform becomes clipped.
8. Reference Output Level: Playback output level when meter indicates 0dB.

*Manufactured under license from Dolby Laboratories.
*Dolby and DD are trademarks of Dolby Laboratories.

2. FRONT PANEL FACILITIES



① POWER SWITCH

Power is supplied to the deck when this switch is set to ON, and the level meter lights up.
To turn OFF the power, set it to bottom position.

② TIMER START SWITCH

This is used when the timer is employed along with the deck for unattended recording and wake up playback.

REC: Set to this position to set the deck automatically to the recording mode at the time preset on the timer and to start the recording of programs unattended, for instance.

OFF: Set to this position for normal tape playback and recording.

PLAY: Set to this position to set the deck automatically to the playback mode at the time preset on the timer and to start the playback. The tape playback function can be used to wake up in the morning instead of an alarm clock.

③ CASSETTE HOLDER/EJECT BUTTON

The cassette tapes are loaded into this holder. It jumps out when the EJECT button is depressed. To close the holder, push the top back until it locks.

④ REMAINING TAPE MARKER

If this marker is visible, it means that there is enough tape remaining for several minutes of recording or playback.

⑤ COUNTER RESET BUTTON/TAPE COUNTER

Depress this button to reset the tape counter display to "000."
Tape counter indicates the position of the tape run.

⑥ LEVEL METERS

These indicate the input level during recording and the output level during playback.

⑦ INPUT (RECORDING LEVEL) CONTROLS

Use these to adjust the level of the input signals from the MIC jacks or rear panel LINE-INPUT.
Turning these controls to the right increases the level.
The controls are coupled to the left and right channels, but you can also use them to adjust the right channel (back) and the left channel (front) independently.

⑧ HEADPHONE JACK

This is the output jack for stereo headphones. Plug your headphones into this jack when you want to monitor the quality of a recording or when you want to listen to a tape privately.

NOTES:

- *Use low-impedance headphones. If you use a high-impedance model, you will not be able to obtain sufficient volume.*
- *You will damage the microphone if you plug it into this jack by mistake.*

⑨ MIC JACKS

These are the input jacks for microphone recording. Plug the left channel microphone into the L jack and the right channel microphone into the R jack.

⑩ REC MUTE SWITCH

While this switch is depressed (ON) during recording (switch is kept depressed), blanks can be recorded on the tape since the input signals are not recorded.

⑪ DOLBY NR SWITCH

Set this switch to ON for recording with the built-in Dolby noise reduction system and for the playback of tapes which have been recorded using the Dolby NR system.

⑫ TAPE SELECTOR

This selector allows the bias and equalizer characteristics to be selected during recording and the equalizer characteristics during playback in line with the type of tape you are using.

STD position: For using standard or LH tapes
Fe-Cr position: For using ferrichrome tapes
HIGH position: Set to this position when using chrome or metal tapes and then set the right-hand switch to CrO_2 or METAL.
- **CrO_2;** For using chrome tapes
- **METAL;** For using metal tapes

⑬ OPERATING SWITCHES

◀◀ (REW): Depress this switch to rewind the tape at high speed. (The tape will travel from right to left.)
▶▶ (FF): Depress this switch to send the tape forward at high speed. (The tape will travel from left to right.)
■ (Stop): Depress this switch to stop the tape run and to release the operating switches.
► (Play): Depress this switch when playing back a tape. (The tape will travel from left to right.)
REC: Depress this switch together with the ► (Play) switch for recording.
This switch will not work when a cassette is not loaded or when the erasure prevention tabs of a loaded cassette have been broken off.
PAUSE: Depress this switch to stop the tape temporarily during recording or playback. Depress ► (Play) switch to allow the tape to continue to travel.

NOTE:
- *The operating switches will not return to their original positions even when the power is switched OFF.*

3. DISASSEMBLY

BONNET

Remove screws ❶ .

Front Panel

Remove screws ❷ .

Mechanical Ass'y

1. Disconnect the sensing belt coupling the take-up reel base to the runner.
2. Remove screws ❸ .

Base Plate

Remove screws ❹ .

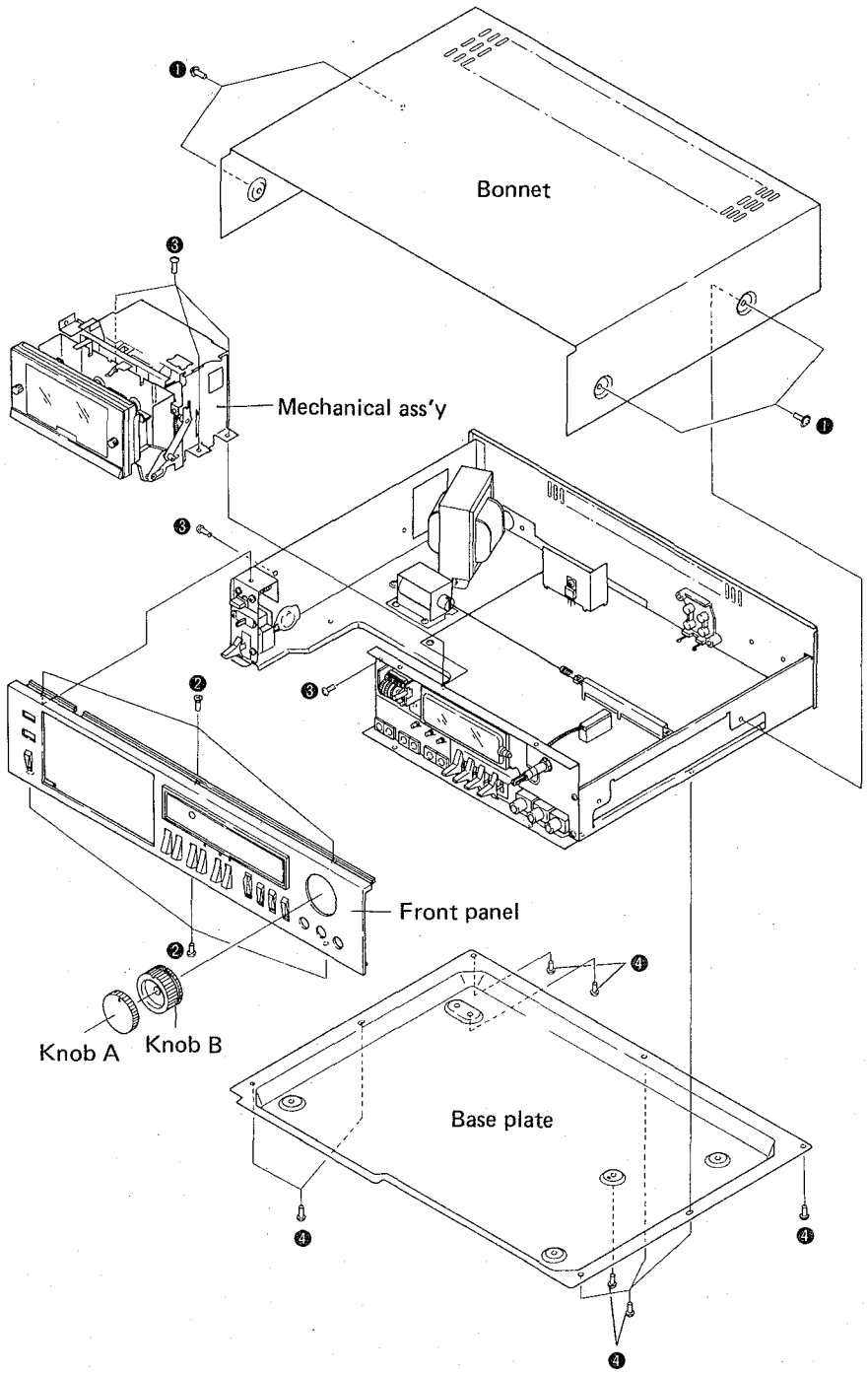
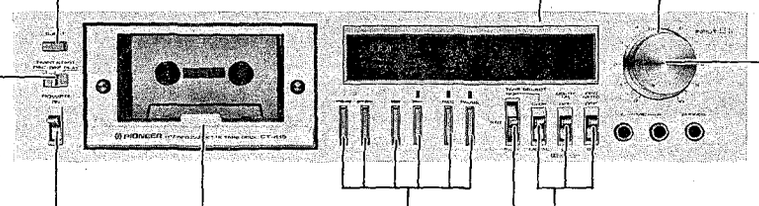


Fig. 1-1 Disassembly

4. PARTS LOCATION

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

Front Panel View



Front panel sub assembly
RXX-285

Eject knob (EJECT)
RAC-126

Knob B (INPUT)
RAA-319

Knob A (INPUT)
RAA-318

Stand-by knob
(TIMER START)
RAC-127

Lever knob A (POWER)
RAC-124

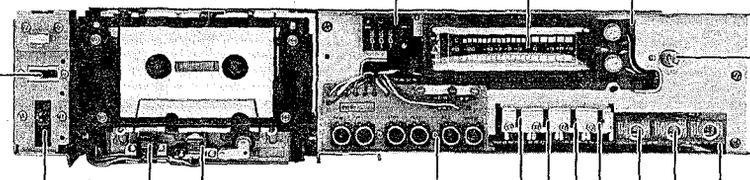
Pocket door assembly
RXX-274

Lever Knob A
(TAPE SECLECTOR, DOLBY NR,
REC MUTE)
RAC-124

Lever knob B (TAPE SELECT)
RAC-125

Control knob
RAC-126

Front View with Front Panel Removed



F.L. meter
FIP 19A 14YS

Counter
RAW-130

F.L. meter assembly
RWX-352

Timer switch assembly
RWS-082

Variable resistor (INPUT)
RCV-080

⚠Power switch
RSA-039

Headphones jack
RKN-060

Erase head
PPB-056

MIC jack
RKN-059

REC/PB head
RPB-070

Lever switch C (REC MUTE)
RSK-060

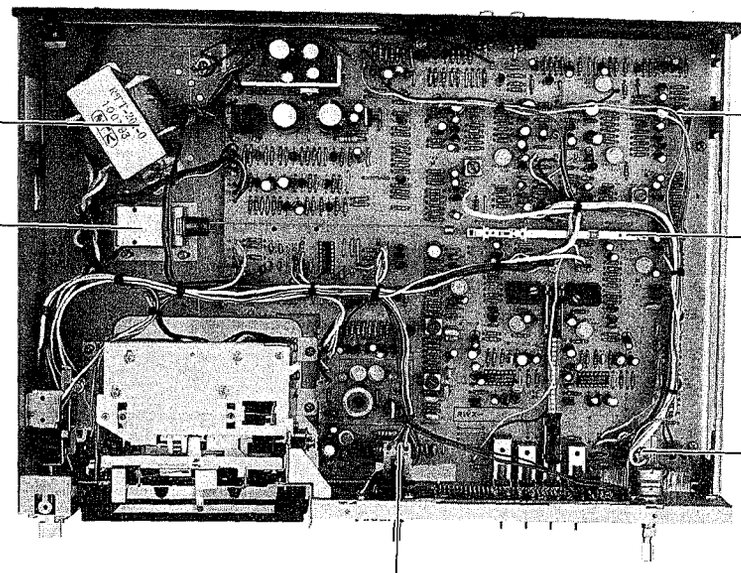
Function switch assembly
RWS-081

Lever switch W
(DOLBY NR)
RSK-061

Lever switch B (TAPE SELECT)
RSK-059

Lever switch A (TAPE SELECT)
RSK-058

Top View with Bonnet Removed



⚠Power transformer
RTT-207

⚠Solenoid
RXP-085

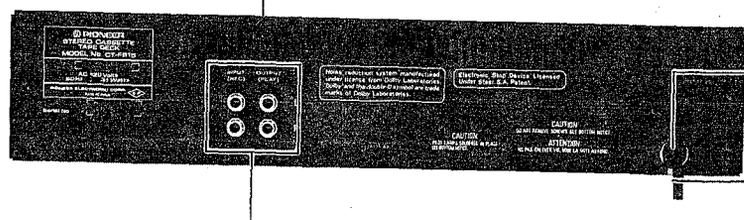
Mother assembly
RWX-351

Slide switch (REC/PLAYBACK)
RSH-049

VR assembly
RWX-353

Sensor assembly
RWX-354

Rear Panel Removed



Bonnet
RNA-462

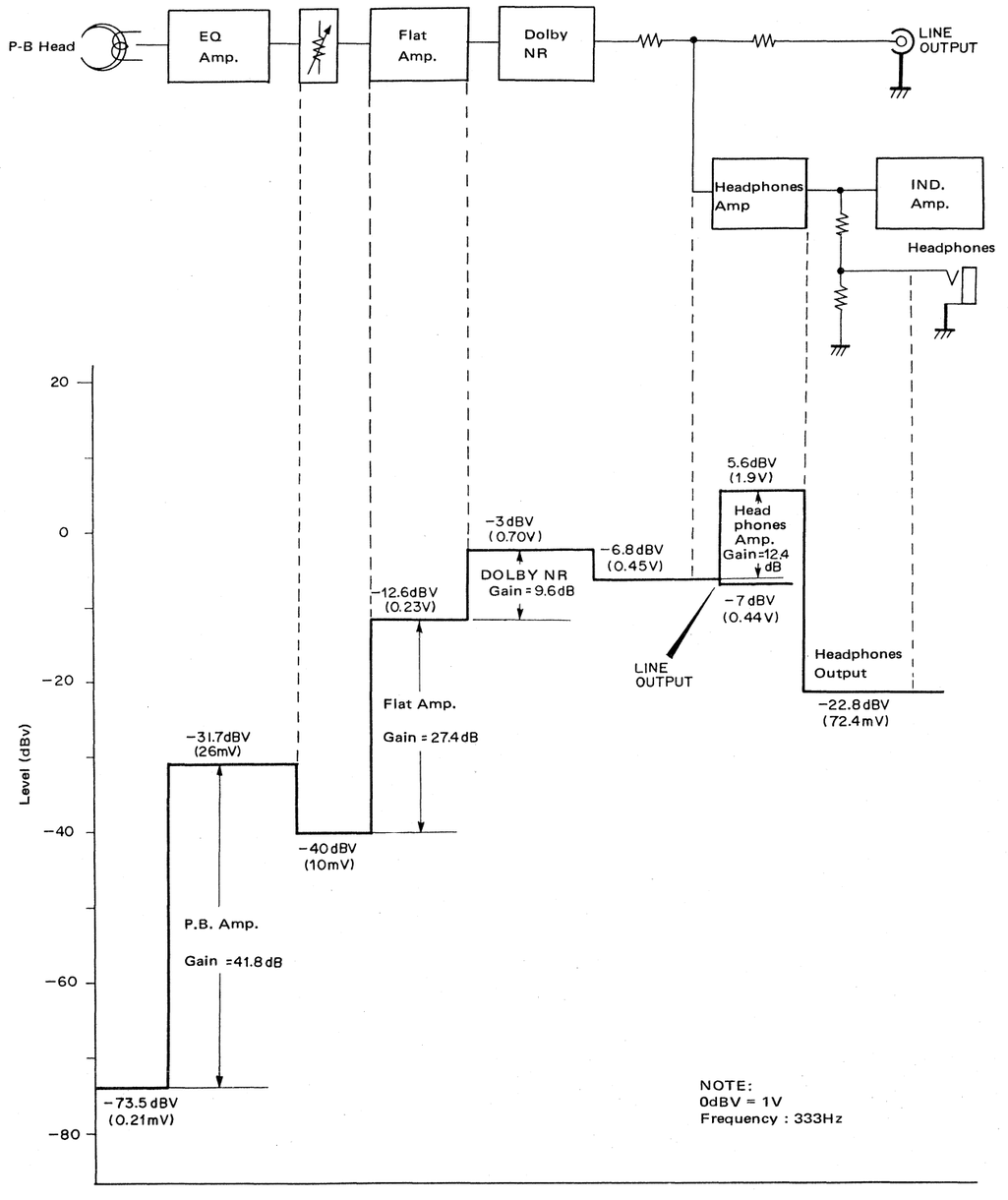
⚠Strain relief
REC-272

⚠Power code
RDG-022

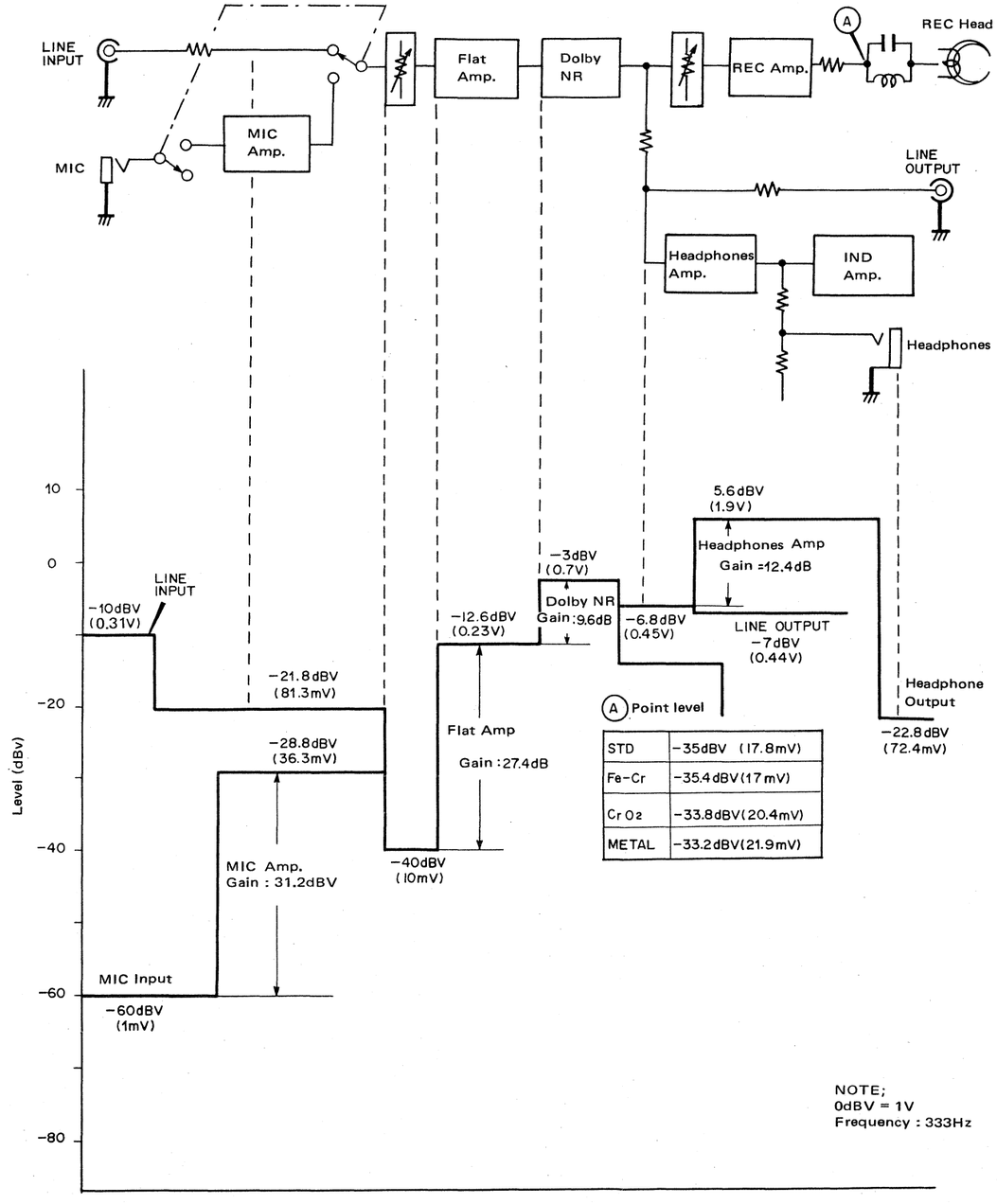
4P mount pin jack
(LINE)
RKB-014

5. LEVEL DIAGRAM

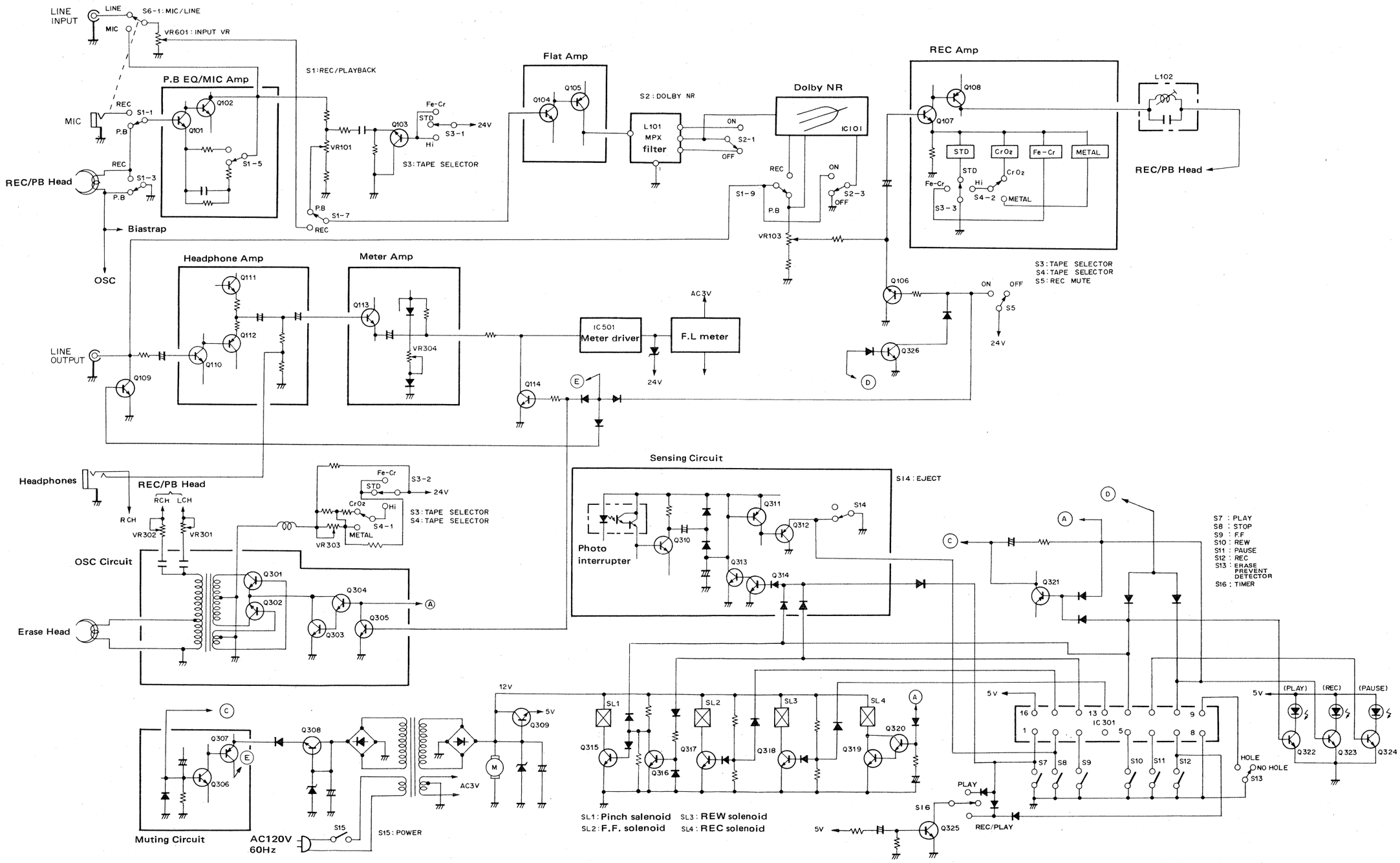
Playback



Recording



6. BLOCK DIAGRAM



7. CIRCUIT DESCRIPTIONS

7.1 SIGNAL PATHS

For an outline of the overall circuitry, see the block diagram on page 11.

Play Mode

The output signal from the playback head is first equalized in the playback equalizer amplifier (Q101, Q102) according to the type of tape being employed, and then passed to the flat amplifier (Q104, Q105) where it is amplified to a fixed level. The output of this stage is then applied to the LINE OUTPUT via the Dolby amplifier.

Recording Mode

The input signal from MIC is first amplified to a fixed level by the MIC amplifier (Q101, Q102), and then applied via the MIC position of the S6-1 MIC/LINE switch (MIC position switched in automatically when microphone plugged into the microphone jacks) to the INPUT volume control, flat amplifier, and Dolby amplifier. Part of the Dolby amplifier output is applied to the LINE OUTPUT, while the other part is applied to the recording amplifier via the REC LEVEL ADJ. VR103 control. After the frequency response has been equalized by the recording amplifier equalizer circuit (according to the type of tape being employed), the signal is applied to the recording head.

The input signal from the LINE INPUT is passed via S6-1 to the flat amplifier, MPX filter, and Dolby amplifier.

7.2 RECORDING AND PLAYBACK CIRCUITS

MIC/Equalizer Amplifier (Q101, Q102)

Consisting of 2 NPN transistors, this 2-stage direct-coupled NFB amplifier is used as the MIC amplifier (flat frequency response) during recording mode by switching out the NFB circuit. During playback mode, the NFB circuit is used as a time constant circuit for use as the playback equalizer amplifier.

Flat Amplifier (Q104, Q105)

The flat amplifier is also a 2-stage direct coupled amplifier, but consisting of one NPN and one PNP transistor. With flat frequency response, this line amplifier amplifies recording inputs and playback inputs prior to being applied to the Dolby amplifier.

Dolby Amplifier

The Dolby noise reduction system employed in the CT-F615 is the Dolby B circuit. In the mid and high frequency ranges where unwanted noise is more prominent, the level of input signals whose input level is below a certain fixed level (the Dolby level) is boosted prior to recording, and automatically reduced again (by the same amount) during playback. Tape hiss is also reduced by the same amount, resulting in the S/N ratio being improved by up to 10dB in this region (above 5kHz).

The Dolby processor in the CT-F615 employs an IC (PA4005) developed by Pioneer. Unlike more conventional Dolby ICs which utilize variable resistance elements, the PA4005 employs a voltage controlled variable gain circuit (VCA).

Recording Amplifier (Q107, Q108)

This circuit is another 2-stage direct coupled amplifier consisting of an NPN and a PNP transistor. The input circuit has been equipped with a low end compensatory circuit, the emitter with a high end compensatory peaking circuit, and the output circuit with a recording bias trap to prevent flow back of recording bias.

HEADPHONE AMPLIFIER (Q107, Q108)

This SEPP circuit consisting of 2 NPN transistors and a PNP transistor divides the output signal by resistors in order to apply the same signal to both the headphone output and the meter amplifier.

Oscillator Circuit

An outline of the oscillator circuit is shown in Fig. 7-1. When the front panel REC and PLAY keys are pressed together, the IC301 REC output is switched to high (H) level, resulting in a signal being passed via R312, R309, Q304, and Q303, thereby turning these 2 transistors on to start up the oscillator.

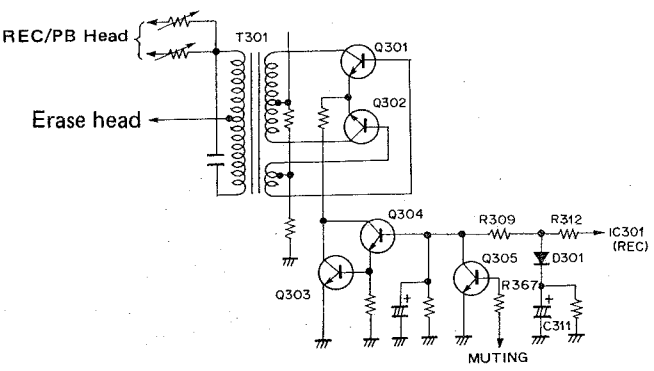


Fig. 7-1 Oscillator Circuit

Meter Amplifier

The level meter circuit is outlined in Fig. 7—2. The headphone amplifier output is amplified by Q113 and rectified by D101, the resultant DC component then being applied to IC501 (meter drive).

This IC consists of 12 comparator elements used for level display purposes. +B is applied to the minus pole of the comparators to serve as the reference voltage for each element, these voltages being set at increasingly higher levels for each higher level display segment. DC components of the D101 rectified signal are compared with the comparator reference voltages, resulting in the lighting up of those segments where the DC component is higher than the reference voltage.

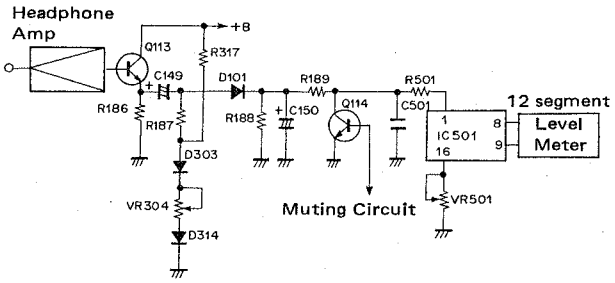


Fig. 7-2 Level Meter Circuit

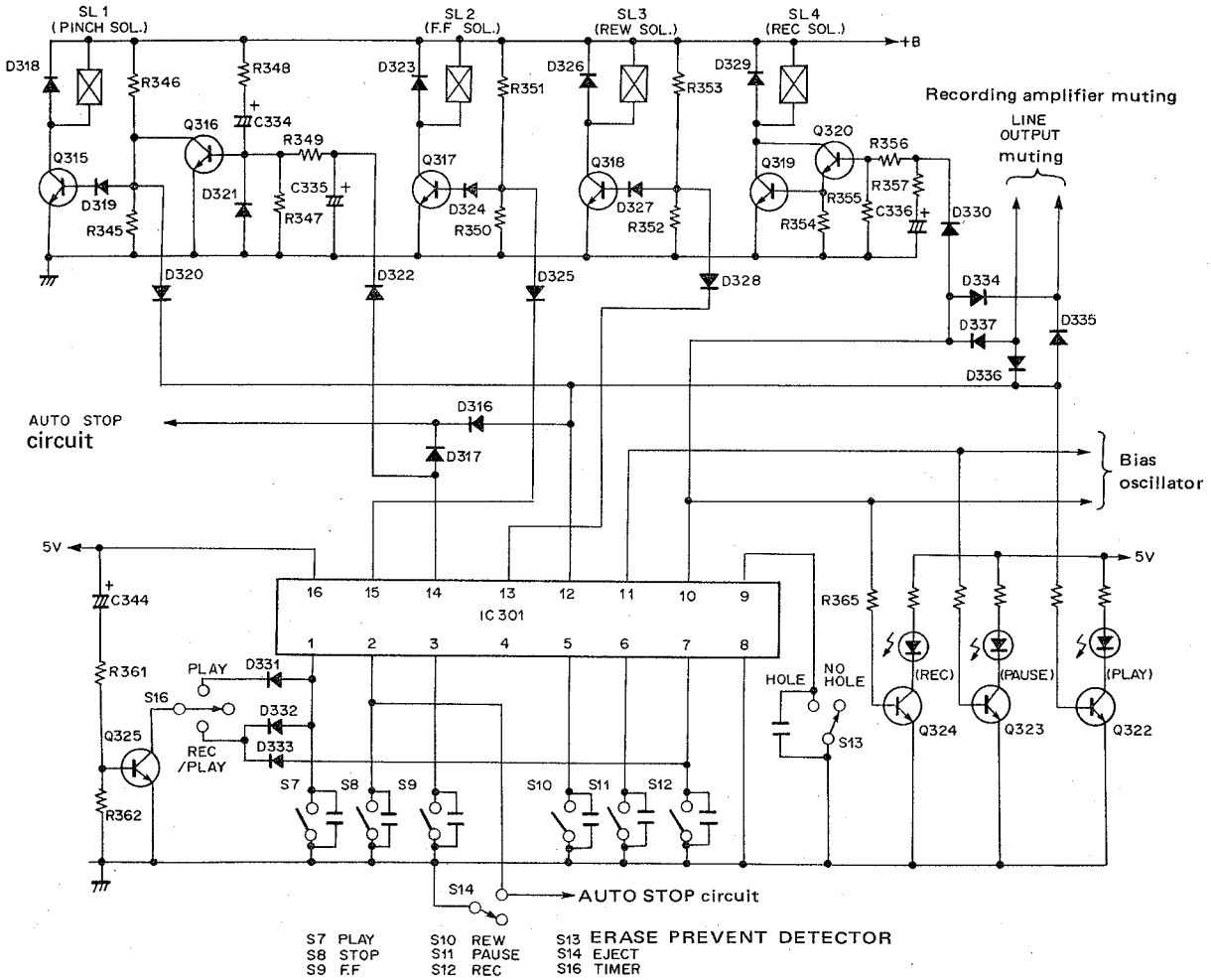


Fig. 7-3 Control Circuit

7.3 CONTROL CIRCUIT

See Fig. 7-3 for an outline of the control circuit.

Play Mode

1. When the PLAY switch S7 is turned on, pin 12 of IC301 is switched to H level, resulting in +B being applied to Q315 via R346 and D319, thereby turning the transistor on.
2. The pinch solenoid SL1 is thus activated to commence play mode.

Recording Mode

1. Load a cassette half with the erasure prevention tabs still intact (in which case the erasure prevention switch S13 will be in the NO HOLE position). When the PLAY switch S7 switch and REC switch S12 are turned on together, pins 12 and 10 of IC301 are switched to H level.
2. Due to the H level on pin 10, a current flows via D330, R356, Q320 and Q319, thereby turning these two transistors on. The REC solenoid SL4 is thus activated, and the REC/PB selector switch set to the REC position.
3. And as has already been described under "Oscillator circuit", the bias oscillator circuit is also activated when pin 10 of this IC is switched to H level.
4. As a result of pin 12 being switched to H level, pinch solenoid SL1 is activated as was described above under "Play Mode".
5. If the erasure prevention tabs of the loaded cassette have been broken off (and S13 thus switched to the HOLE position), pin 9 of IC301 will be shorted to ground, thereby preventing pin 10 from being switched to H level. Recording mode will therefore not be possible.

Fast Forward (Rewind) Mode

1. When the FF switch S9 is turned on, pin 15 of IC301 is switched to H level, resulting in +B being applied to Q317 via R351 and D324 to subsequently turn the transistor on.
2. The FF solenoid SL2 is then activated to start fast forward mode.
3. The operation is basically the same during rewind mode. Pin 13 of IC301 is switched to H level when the REW switch S10 is turned on, resulting in the activation of the REW solenoid SL3.

Pause Mode

1. If the PAUSE switch S11 is turned on during playback or recording mode, pin 12 of IC301 is switched from H to L level, resulting in Q315 being turned off.
2. Pinch solenoid SL1 will thus be released, thereby temporarily stopping tape transport.

Timer Start

- **Play Mode**

1. The timer switch S16 is in the PLAY position when the power switch is turned on by timer.
2. At the same time that the power supply voltage rises, Q325 is turned on by the C344 charging current.
3. And since pin 12 of IC301 is at H level, current will be applied to the base of Q315. However, because of the time constant circuit consisting of R348, C334 and R347, Q316 will be turned on for 2 to 3 seconds, consequently keeping Q315 turned off during this period.
4. Once C334 is fully charged up, Q316 is turned off and Q315 turned on. Pinch solenoid SL1 is then activated to start playback mode.

- **Recording Mode**

1. The timer switch S16 is in the REC position when the power switch is turned on by timer.
2. Pin 12 and 10 of IC301 are both switched to H level at the initial onset of power. The REC solenoid is thereby activated (since pin 10 is at H level) and the bias oscillator started.
3. And as was described above for "Timer Play Mode", the pinch solenoid SL1 is activated some 2 to 3 seconds after the power switch is turned on.

Timing for Direct Switching Operations

To enable the CT-F615 to be switched directly from fast forward or rewind mode to playback mode without generating tape slack or other mechanical trouble, tape transport has been designed to stop for fixed period of times during such switching operations.

Direct Switching from Fast Forward (Rewind) Mode to Playback Mode

1. Since pin 14 of IC301 is at H level during fast forward (or rewind) mode, a charging current is applied to C355 via D322. At the same time, a current is also applied to Q316 via D322 and R349, thereby maintaining Q316 on.
2. When the PLAY switch S7 is turned on, pin 12 of IC301 is switched to H level, and pin 14 to L level. The C335 discharge current, however, is applied to Q316 via R349 for about 0.3 seconds longer, thereby keeping this transistor turned on for that extra time. Activation of pinch solenoid SL1 is thus delayed by that same period of time.

Auto Stop Circuit

When tape transport stops, IC301 is put into STOP mode, and the mechanism brought to a stop by this auto stop circuit (see Fig. 7-4). Tape transport detection involves a photo-interrupter system — a runner (which cuts across a light beam) coupled by belt to the take-up reel base.

1. During tape transport, the photo-interrupter generates pulse signals by means of the rotating runner. Consequently, Q310 is turned on and off repeatedly, and C332 charged up and discharged with equal frequency.
2. When tape transport stops and the runner ceases to rotate, the photo-interrupter stops generating pulse signals, and the Q310 switching action stops. +B is then applied to C332 via R334 and R335 to charge up the capacitor.
3. Charging up of C332 is also accompanied by an increase in the Q311 base potential, resulting in the transistor being turned off. Q312 is then turned on, and IC301 put into STOP mode. Note that the auto stop circuit involving Q313 and Q314 is activated during playback, fast forward and rewind modes only.

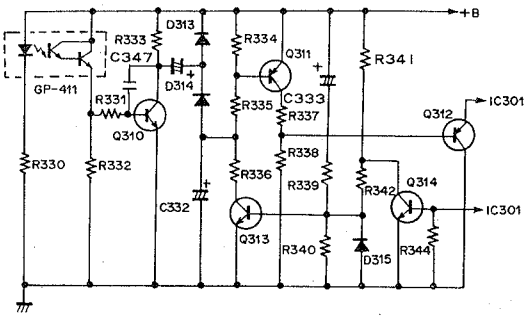


Fig. 7-4 Auto Stop Circuit

7.4 MUTING CIRCUIT

See Fig. 7-5.

When Power Switch is Turned On

1. When the power switch is turned on, +B is applied Q306 via R321 and C318. However, Q306 does not turn on until C318 is charged up about 3 seconds later.
2. Since Q307 is turned on at this time, +B is applied to Q109 (Q209) via D316, Q307, D302, and R170 (R270). And once Q109 (Q209) is turned on, the LINE OUTPUT is muted.
3. +B is also applied via Q307 and D305 to Q114 (Q214) to mute the level meter. Furthermore, by applying +B to Q106 (Q206) via Q307, D306, and R146 (R246), the recording amplifier is also muted.

Muting During Fast Forward, Rewind and Stop Modes

1. Since both pin 10 and pin 12 of IC301 are switched to L level during fast forward, rewind and stop modes, the Q321 base potential is dropped, resulting in this transistor being turned on.
2. +B is then applied to Q306 via R358 and Q321 to turn Q306 on, resulting in the LINE OUTPUT, recording amplifier and level meter being muted in the same way as when the power switch is turned on.

When Switching from Stop to Recording Mode

This muting circuit mutes the noise generated when the REC selector is switched, and therefore prevents this noise from being recorded during "after recording".

Although pin 10 of IC301 is kept at H level during recording mode, current continues to pass via R366, C345 and Q306 until C345 is fully charged (taking about 0.3 seconds). So while Q306 remains on, the LINE OUTPUT, recording amplifier and level meter are muted.

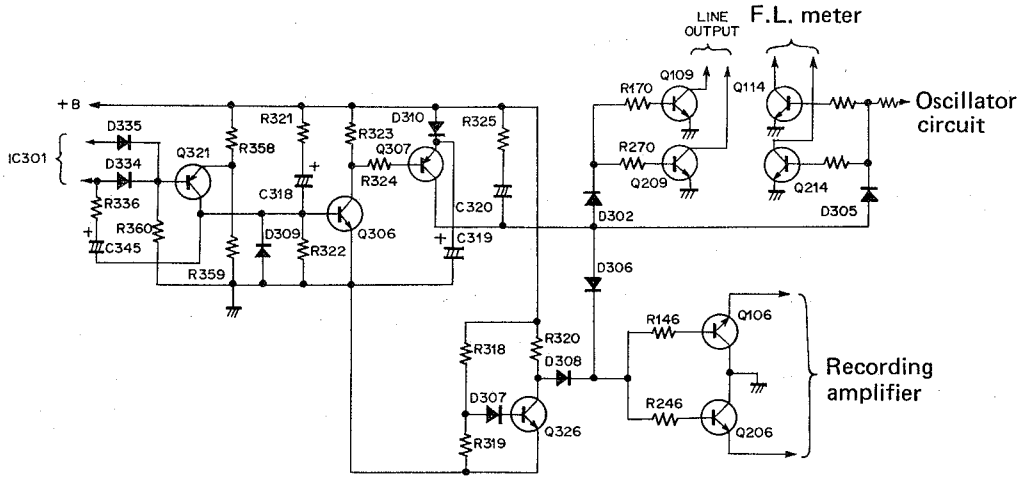


Fig. 7-5 Muting Circuit

7.5 TIMING CHART

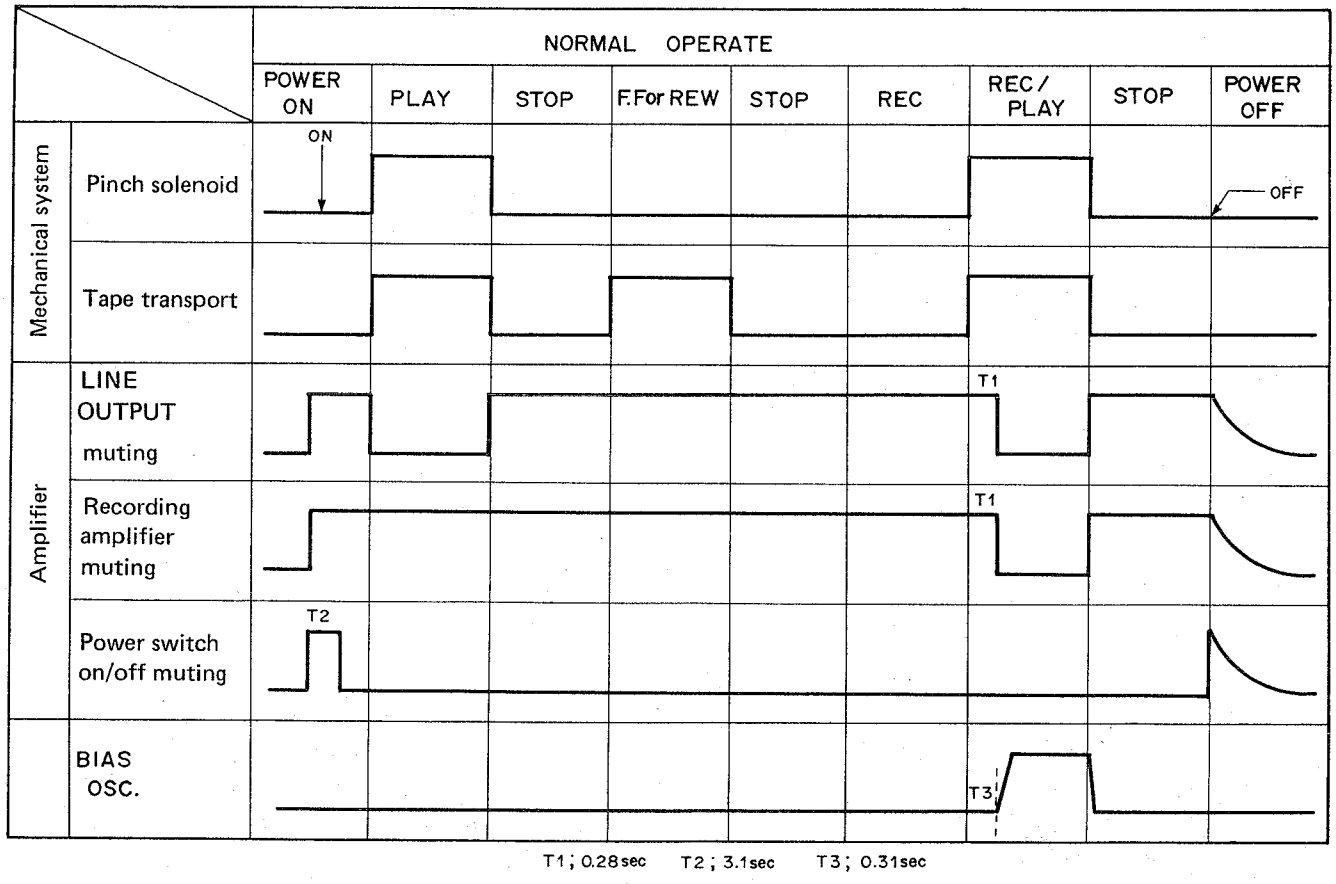


Fig. 7-6 Time Chart

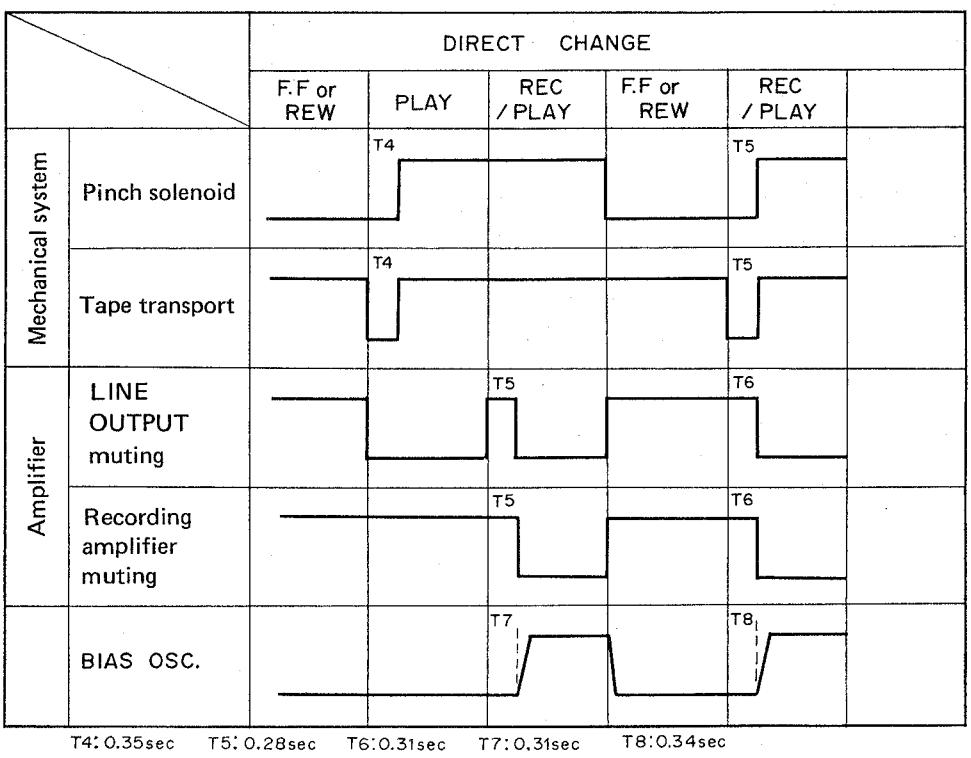


Fig. 7-7 Time Chart

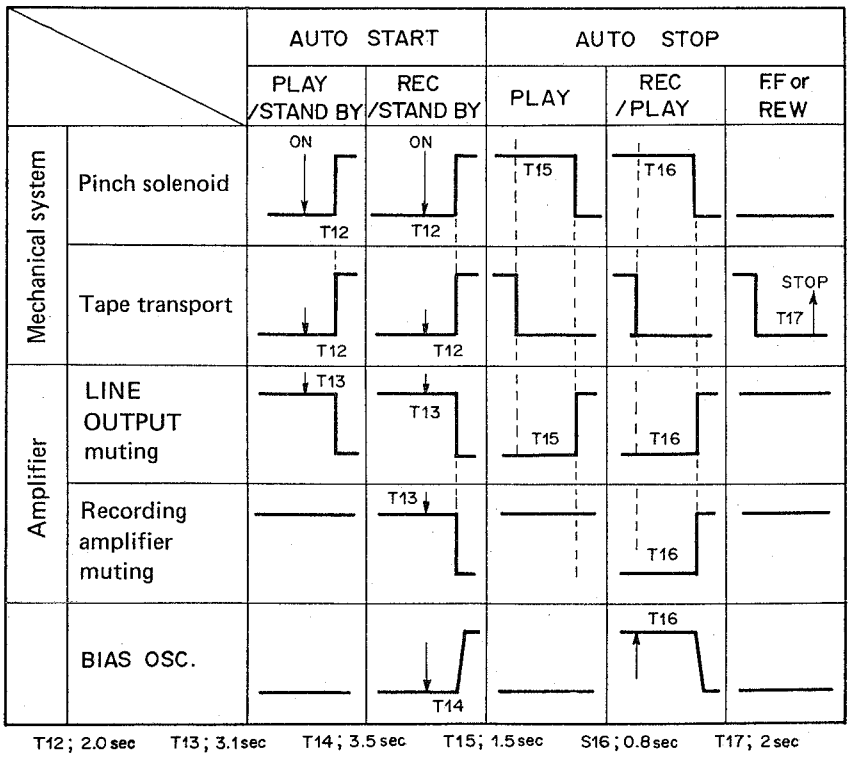


Fig. 7-8 Time Chart

8. MECHANICAL ADJUSTMENTS

8.1 PINCH ROLLER PRESSURE ADJUSTMENT

1. Put the deck into playback mode.
2. Gently push against the pinch roller arm with a tension gauge (spring balance of approximately 500g full scale) and separate the pinch roller slightly from the capstan.
3. Then ease the pinch roller back onto the capstan, and read off the value when the pinch roller starts to rotate. If the reading fails to lie within 240 to 350g, replace the pinch roller pressure spring (RBH-651).

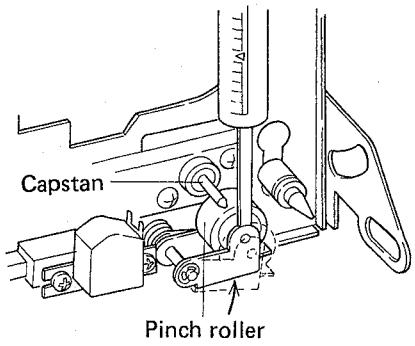


Fig. 8-1 Pinch Roller Pressure Adjustment

8.2 REEL BASE TORQUE ADJUSTMENT

Prior to Adjusting

Wipe both reel bases, the capstan shaft and the pinch roller with Daiflon dipped in a little anhydrous alcohol.

Adjustment

Measure the torque with a torque meter during playback, fast forward and rewind modes. The measured values should normally lie within the allowable ranges listed in the following table. If the measured values lie outside the relevant ranges, replace the take-up reel base ass'y (RXB-272) and/or the drive arm ass'y (RXB-274).

	Take-up reel base	Supply reel base
Playback mode	35~55g·cm	*2~6g·cm
F.F mode	70~120g·cm	*2~6g·cm
REW mode	*2~6g·cm	70~120g·cm

* denotes back tension torque

8.3 TAPE SPEED ADJUSTMENT

1. Connect a frequency counter to the output terminals.
2. Playback the 3kHz portion of the STD-301 test tape. At the beginning, the frequency should lie within the 2995 to 3010Hz range, and may be adjusted by turning the semi-fixed resistor located in the capstan motor adjustment hole (using a suitable size screw-driver). (See Fig.8—2).
3. Tape speed is increased by turning the resistor clockwise, and decreased by turning counter clockwise.

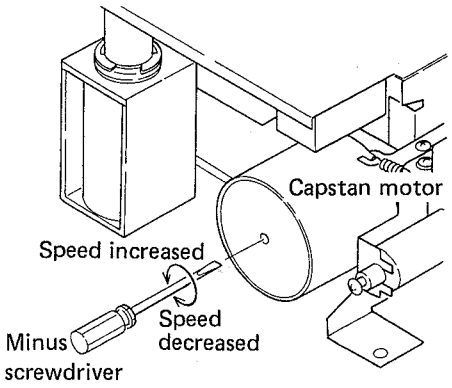


Fig. 8-2 Tape Speed Adjustment

8.4 PLAY SOLENOID ADJUSTMENT

1. Put the deck into playback mode.
2. Loosen screws ❶ and adjust the mounting position of the play solenoid so that the square hole of the head chassis ass'y fits flush against the shaft bearing holder (i.e. 0 separation), as shown in Fig.8—3.

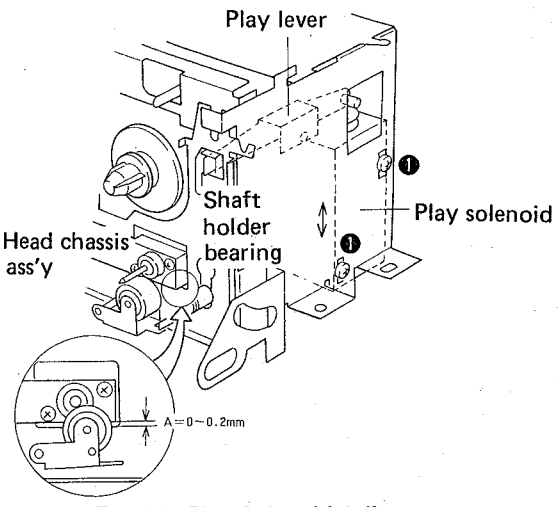


Fig. 8-3 Play Solenoid Adjustment

8.5 F.F SOLENOID ADJUSTMENT

1. Put the deck into fast forward mode.
2. Loosen screws ❷ and adjust the fast forward solenoid mounting position so that the square hole of the reel base ass'y is flush against the boss of the drive arm ass'y (i.e. 0 separation) as shown in Fig.8—4.

8.6 REW SOLENOID ADJUSTMENT

1. Put the deck into rewind mode.
2. Loosen screws ❶ and adjust the rewind solenoid mounting position so that the boss of the drive arm ass'y fits flush against the square hole of the reel base ass'y (i.e. 0 separation) as shown in Fig.8—4.

8.7 REC SOLENOID ADJUSTMENT

1. Put the deck into recording mode.
2. Loosen screws ❶ and adjust the recording solenoid mounting position so that the recording spring is stretched by 0.5 to 1mm as shown in Feg.8—5.

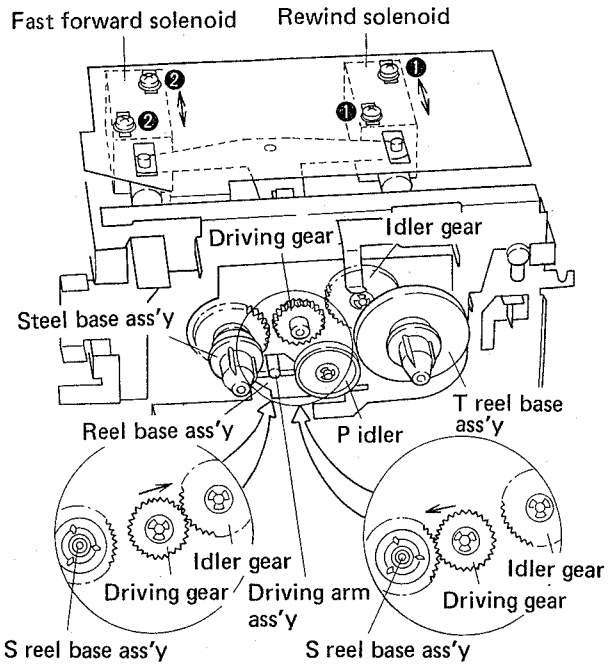


Fig. 8-4 Fast Forward and Rewind Solenoid Adjustment

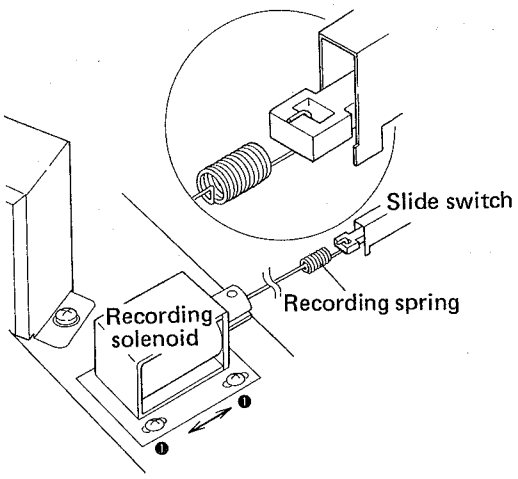


Fig. 8-5 Recording Solenoid Adjustment

9. ELECTRICAL ADJUSTMENS

Before Starting Any Electrical Adjustments, First Check Through the Following List of Preparatory Items.

1. Electrical adjustments should only be commenced after all mechanical adjustments have been completed.
2. Levels during measurements are based on 0dBv = 1V. Connect a 50kΩ (47 ~ 52kΩ) dummy resistor to the OUTPUT terminals.
3. Designated test tapes must be used for all relevant adjustments. Although both side A and B of the test tapes have been prepared, it is recommended that only side A (the side with the label) be used.
   STD-331A: general purpose during playback mode.
   STD-341A: adjustments during playback mode.
   STD-601: STD blank tape.
   STD-603: CrO_2 blank tape.
   STD-604: METAL blank tape.
   SONY DUAD C-60: Fe-Cr blank tape
4. Prepare the following measuring apparatus. AC millivoltmeter, low frequency oscillator, attenuator, oscilloscope.
5. Unless otherwise specified, all adjustments are for both left and right channels.
6. Clean and demagnify the head.
7. Leave the DOLBY NR switch off unless directed otherwise.
8. Let the deck warm up (aging) for a few minutes before proceeding with the adjustments. Before starting the recording and playback frequency response adjustments, wait for about 3 to 5 minutes.
9. Proceed with each adjustment in the specified order. Altering the order can hinder proper adjustment, resulting in loss of performance.

Adjustment Order

1. Head azimuth adjustment
2. Playback equalizer check
3. Playback level adjustment
4. F.L. meter adjustment
5. Recording rough adjustment
6. Erasure current adjustment
7. Bias trap adjustment
8. Recording bias rough adjustment
9. Recording/playback frequency response adjustment/check
10. Recording level adjustment

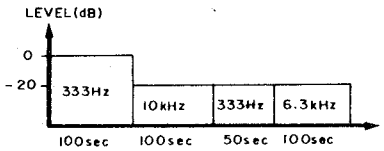


Fig. 9-1 Test tape STD-341A

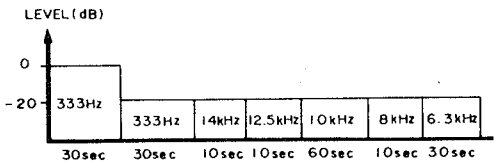


Fig. 9-2 Test tape STD-331A

9.1 HEAD AZIMUTH ADJUSTMENT

1. Connect the AC millivoltmeter to the OUTPUT terminals.
2. Turn up the OUTPUT level control to maximum position, and set the TAPE switch to the STD position. Then turn VR101 (Lch) and VR201 (Rch) up to maximum positions.
3. Play the 10kHz/−20dB portion of the STD-331A test tape, and turn the head azimuth adjustment screw so as to obtain maximum output levels in both left and right channels.
4. After completing this adjust, lock the screw with "screw lock".

9.2 PLAYBACK EQUALIZER CHECK

1. Again connect the AC millivoltmeter to the OUTPUT terminals, and set the TAPE switch to STD.
2. Play the 333Hz (−20dB) and 6.3kHz portions of the STD-341A test tape, and check that the difference in output level between the two is +0.5 ± 1dB.
3. Next set the TAPE switch to the Fe-Cr position (or the CrO_2 or METAL position), and repeat step 2. In this case, the 6.3kHz output should differ from the 333Hz output level by −3.5 ± 1dB.

9.3 PLAYBACK LEVEL ADJUSTMENT

1. Connect the AC millivoltmeter to TP3 (Lch) and TP4 (Rch) of the mother ass'y. (The OUTPUT level control may be set to any position).
2. Play the 333 Hz/0dB portion of the STD-341A test tape, and adjust VR101(Lch) and VR201 (Rch) so that the AC millivoltmeter reads 1 dBv (1.1V).

9.4 F.L METER ADJUSTMENT

1. Apply a 333Hz/−10dBv (316mV) signal to the INPUT terminals with the deck in recording mode.
2. Connect the AC millivoltmeter to TP1(Lch) and TP2(Rch) of the mother ass'y, and adjust the INPUT level control to obtain a millivoltmeter reading of −23dBv (70mV).
3. Once the above settings have been completed, turn VR304 (mother ass'y) counter clockwise to the point where the −20dB segment of the F.L meter goes out (i.e. at the very instant).
4. Then adjust the INPUT level control to obtain a millivoltmeter reading of −3dBv (700mV), and adjust VR501(Lch) and VR502(Rch) on the F.L meter ass'y so that the F.L meter reads 0dB (turn VR501 and VR502 around clockwise and stop at the point where the 0dB segment lights up).
5. While turning the INPUT level control up gradually from minimum position, check that the AC millivoltmeter gives the following reading at the corresponding F.L meter positions.

F.L Meter Reading	AC mV Meter Reading
−20dB	$-23\pm\frac{4}{2}$ dBv (56mV~112mV)
+5dB	+2±2dBv (1V~1.58V)

Note: If the above ranges are not satisfied, repeat steps 3 and 4 several times to readjust.

9.5 RECORDING ROUGH ADJUSTMENT

1. Apply a 333Hz/−10dBv (316mV) signal to the INPUT terminals with the deck in recording mode. (Since the bias oscillator becomes operable during recording mode, short circuit the base of Q304 to ground).
2. Connect the AC millivoltmeter to TP1 (Lch) and TP2 (Rch) of the mother ass'y, and adjust the INPUT level control so that the millivoltmeter reads −3dBv (700mV).
3. Then set the TAPE switch to the STD position, and connect the AC millivoltmeter to terminals no.69 and no.70 (and then no.78 and no.79) on the mother ass'y.
4. Adjust VR103 (Lch) and VR203 (Rch) so that the millivoltmeter reads 0.34mV (34μA).

9.6 ERASURE CURRENT ADJUSTMENT

1. Adjust VR303 on the mother ass'y to the mechanical center position, and put the deck into recording mode.
2. Turn the INPUT level control down to minimum position (but without short circuiting the base of Q304 to ground).
3. Next set the TAPE switch to the METAL position, and connect the AC millivoltmeter to terminals no.41 and no.37 (ground) on the mother ass'y. Adjust VR303 until the millivoltmeter reads 180mV (180mA).

9.7 BIAS TRAP ADJUSTMENT

1. Put the deck into recording mode, and turn the INPUT level control down to minimum position.
2. With the TAPE switch still in the METAL position, connect the AC millivoltmeter to TP3 (Lch) and TP4 (Rch) on the mother ass'y. Adjust L102 (Lch) and L202 (Rch) to obtain minimum millivoltmeter reading.

9.8 RECORDING BIAS ROUGH ADJUSTMENT

1. Put the deck into recording mode and turn the INPUT level control down to minimum position.
2. Set the TAPE switch to the STD position, and connect the AC millivoltmeter to the mother ass'y terminals no.71 and no.72 (and then no.76 and no.77). Adjust VR301 (Lch) and VR302 (Rch) to obtain a millivoltmeter reading of 3.4mV (340μA).

9.9 RECORDING/PLAYBACK FREQUENCY RESPONSE CHECK AND ADJUSTMENT

1. Connect the AC millivoltmeter to the OUTPUT terminals, set the TAPE switch to STD, and turn the DOLBY NR switch off.
2. Apply a 333Hz/−30dB (31.6mV) signal to the INPUT terminals, and adjust the INPUT level control to obtain a millivoltmeter reading of −27dBv (44.6mV).
3. Record and then play back the 333Hz and 6.3kHz signal in the STD−601 test tape, and adjust VR301 (Lch) and VR302 (Rch) to obtain a difference in output level of +0.5dB.

4. Also record and playback the 12kHz signal, and check that the results satisfy the specifications. If it becomes necessary to readjust VR301 and VR302 due to the specifications not being satisfied, or after checking the frequency response of other tapes (CrO_2, METAL, Fe-Cr), adjust these 2 VRs so as to obtain a playback output difference of $0\ ^{+1}_{-0.5}$ dB with the 6.3kHz signal.
5. Next set the TAPE switch to the Fe-Cr, CrO_2, and METAL positions in turn, and record and play back the prescribed frequencies in the Duad C-60, STD-603 and STD-604 test tapes respectively, checking that the specified ratings are satisfied in each case.

9.10 RECORDING LEVEL ADJUSTMENT

1. Connect the AC millivoltmeter to TP1 (Lch) and TP2 (Rch) on the mother ass'y.
2. Set the TAPE switch to the STD position, and turn the DOLBY NR switch off. Then apply a 333Hz/−10dBv (316mV) signal to the INPUT terminals.
3. Adjust the INPUT level control to obtain a millivoltmeter reading of −3dBv (700mV).
4. Next turn the DOLBY NR switch on, and record the 333Hz signal onto the STD-601 test tape.
5. Play back the signal and adjust VR103(Lch) and VR203 (Rch) so that the millivoltmeter reads −3dBv (700mV).
6. Then switch the TAPE switch to the CrO_2 position and turn the DOLBY NR switch on. Record the 333Hz/−10dBv (316mV) signal onto the STD-603 test tape, and then while playing it back check that a millivoltmeter reading of −3dBv (700mV) ±1.5dB is obtained.
7. Finally set the TAPE switch to the METAL position and record the same signal used in step 6 above onto the STD-604 test tape. Play this signal back in the same way again, and check that a millivoltmeter reading of −3dBv (700mV) ±1.5dB is obtained in this case also.

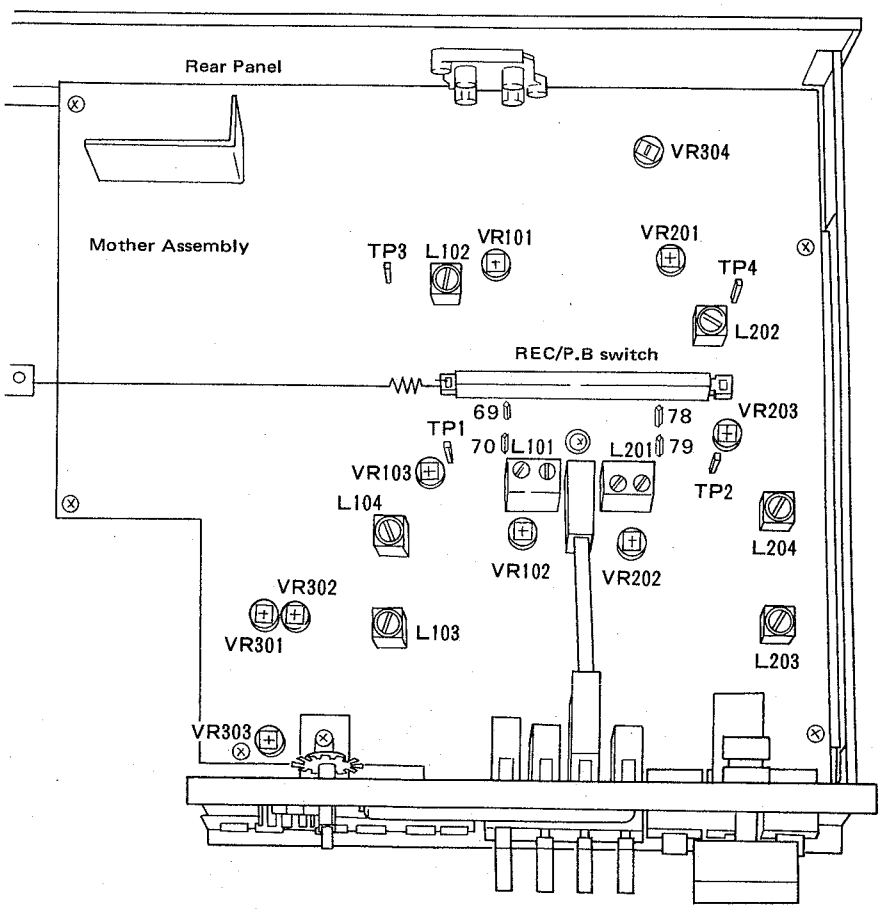


Fig. 9-3 Adjustment Points

10. SCHEMATIC DIAGRAMS, P.C.BOARD PATTERNS AND PARTS LIST

10.1 MISCELLANEA

NOTE:

- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex. 1 *When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).*

560Ω——56 x10¹——561 . . . . . RD¼PS 5 6 1 J
47kΩ——47 x10³——473 . . . . . RD¼PS 4 7 3 J
0.5Ω——0R5 . . . . . RN2H 0 R 5 K
1Ω——010 . . . . . RS1P 0 1 0 K

Ex. 2 *When there are 3 effective digits (such as in high precision metal film resistors).*

5.62kΩ 562 x 10¹ 5621 . . . . . RN¼SR 5 6 2 1 F

- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

Miscellaneous Parts

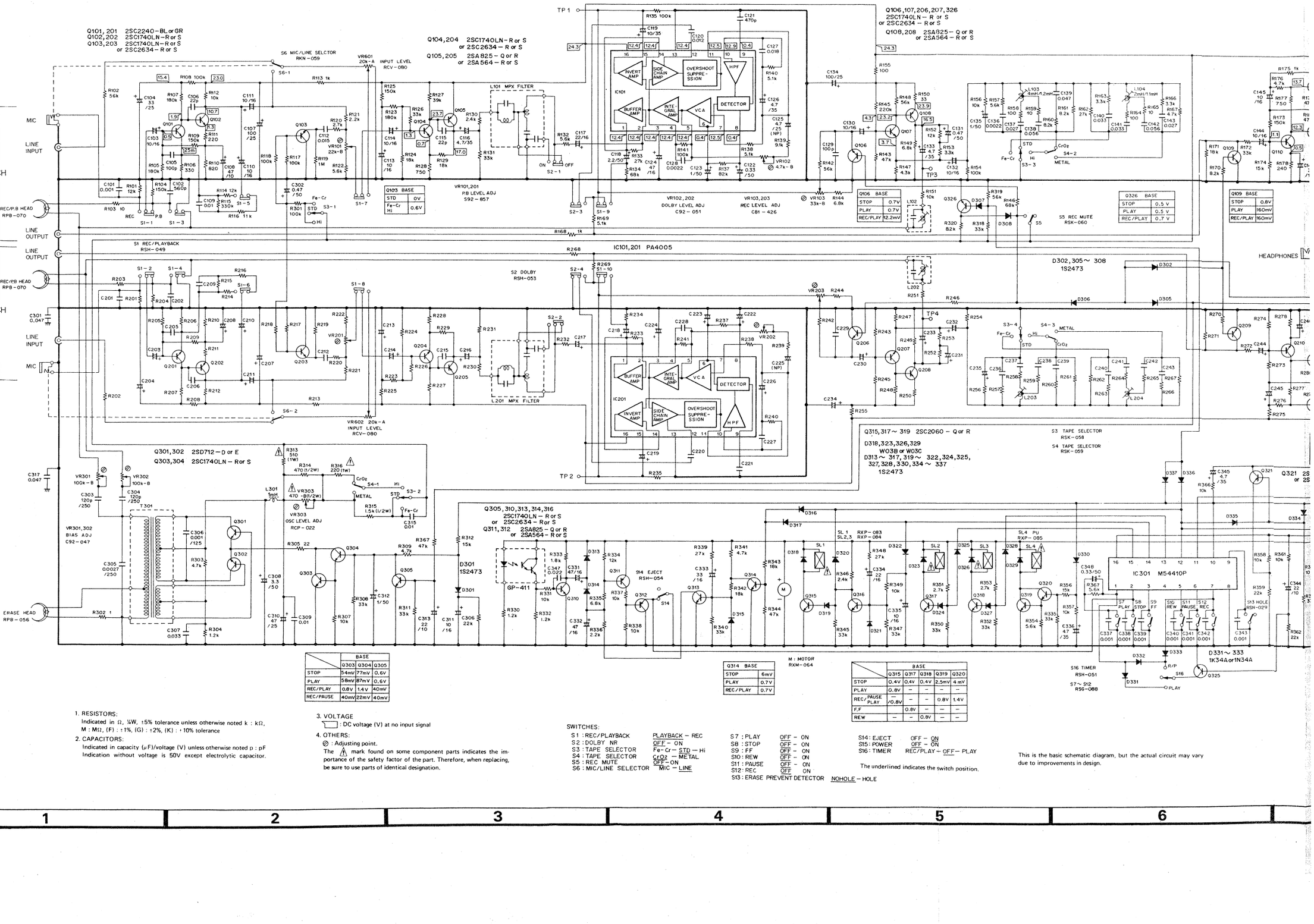
Part No.	Symbol & Description	
⚠ RTT-207	T1	Power transformer
⚠ RCG-006	C1	Capacitor
⚠ RSA-039	S15	Power switch
⚠ RXP-085	SL4	Solenoid
⚠ RDG-022		Power code
REC-297		Capacitor cover
RMB-004		Wire nut
RXX-285		Front panel sub assembly
RWX-351		Mother assembly
RWX-352		F.L. meter assembly
RWS-081		Function switch assembly
RWX-354		Sensor assembly
RWS-082		Timer switch assembly
RWX-353		Volume assembly
RBM-004		Wire nut

List of Changed Parts for Factory Modification

List of changed parts information will be furnished whenever necessary and you are requested to amend parts number in this parts list.

Symbol	Part No.	Description

10.2 SCHEMATIC DIAGRAM


Q101, 201 2SC2240 – BL or GR
Q102, 202 2SC1740LN – R or S
Q103, 203 2SC1740LN – R or S
or 2SC2634 – R or S
Q104, 204 2SC1740LN – R or S
or 2SC2634 – R or S
Q105, 205 2SA825 – Q or R
or 2SA564 – R or S
Q106, 107, 206, 207, 326
2SC1740LN – R or S
or 2SC2634 – R or S
Q108, 208 2SA825 – Q or R
or 2SA564 – R or S
S6 MIC/LINE SELCTOR RKN – 059
VR601 20k – A INPUT LEVEL RCV – 080
VR602 20k – A INPUT LEVEL RCV – 080
L CH
R CH
MIC
LINE INPUT
REC/PB HEAD RPB – 070
LINE OUTPUT
ERASE HEAD RPB – 056
L101 MPX FILTER
L201 MPX FILTER
IC101, 201 PA4005
INVERT AMP
SIDE CHAIN AMP
OVERSHOOT SUPPRESSION
HPF
BUFFER AMP
INTEGRAL AMP
VCA
DETECTOR
VR101, 201 PB LEVEL ADJ S92 – 857
VR102, 202 DOLBY LEVEL ADJ C92 – 051
VR103, 203 REC LEVEL ADJ C81 – 426
S1 REC/PLAYBACK RSH – 049
S2 DOLBY RSH – 053
S3 TAPE SELECTOR RSK – 058
S4 TAPE SELECTOR RSK – 059
S5 REC MUTE RSK – 060
S6 MIC/LINE SELECTOR RKN – 059
S14 EJECT RSH – 054
S16 TIMER RSH – 051
S7 ~ S12 RSG – 088
S13 HOLE RSN – 029
M : MOTOR RXM – 064
Q301, 302 2SD712 – D or E
Q303, 304 2SC1740LN – R or S
Q305, 310, 313, 314, 316
2SC1740LN – R or S
or 2SC2634 – R or S
Q311, 312 2SA825 – Q or R
or 2SA564 – R or S
Q315, 317 ~ 319 2SC2060 – Q or R
D318, 323, 326, 329
W03B or W03C
D313 ~ 317, 319 ~ 322, 324, 325, 327, 328, 330, 334 ~ 337
1S2473
D302, 305 ~ 308
1S2473
D331 ~ 333
1K34A or 1N34A
GP – 411
IC301 M5440P
VR301, 302 BIAS ADJ C92 – 047
VR303 OSC LEVEL ADJ RCP – 022
HEADPHONES
TP1
TP2
TP3
TP4
Q103 BASE
STD 0V
Fe-Cr Hi 0.6V
Q106 BASE
STOP 0.7V
PLAY 0.7V
REC/PLAY 12.2mV
Q326 BASE
STOP 0.5 V
PLAY 0.5 V
REC/PLAY 0.7 V
Q109 BASE
STOP 0.8V
PLAY 160mV
REC/PLAY 160mV
BASE
Q303 Q304 Q305
STOP 54mV 77mV 0.6V
PLAY 58mV 87mV 0.6V
REC/PLAY 0.8V 1.4V 40mV
REC/PAUSE 40mV 22mV 40mV
Q314 BASE
STOP 6mV
PLAY 0.7V
REC/PLAY 0.7V
BASE
Q315 Q317 Q318 Q319 Q320
STOP 0.4V 0.4V 0.4V 2.5mV 4 mV
PLAY 0.8V – – – –
REC/PAUSE PLAY – /0.8V – – 0.8V 1.4V
F.F 0.8V – – –
REW – – 0.8V – –

1. RESISTORS:
   Indicated in Ω, ¼W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ±10% tolerance
2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p : pF
   Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE
   : DC voltage (V) at no input signal
4. OTHERS:
   ⊘ : Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

SWITCHES:

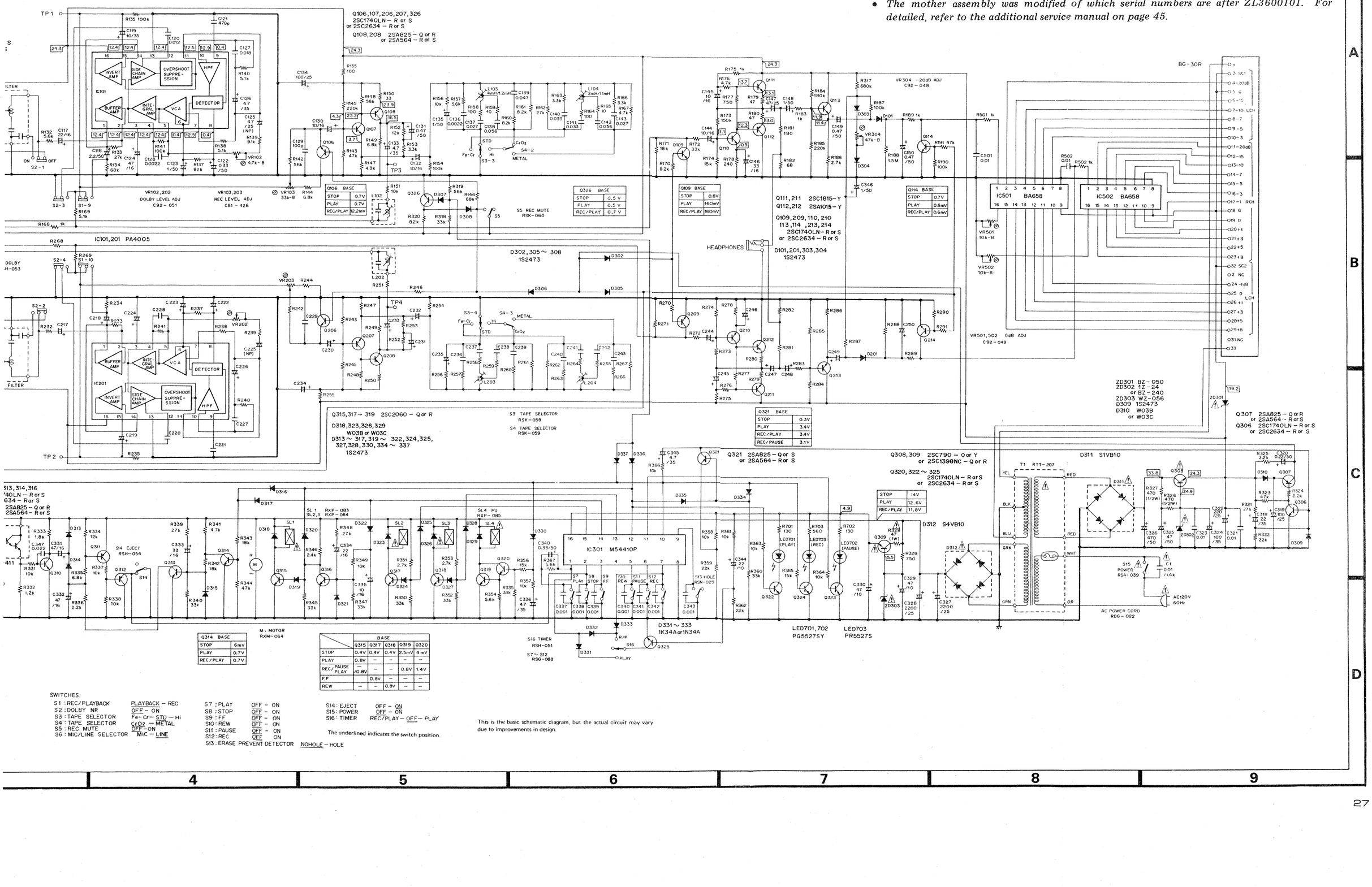
S1 : REC/PLAYBACK PLAYBACK – REC
S2 : DOLBY NR OFF – ON
S3 : TAPE SELECTOR Fe-Cr – STD – Hi
S4 : TAPE SELECTOR CrO2 – METAL
S5 : REC MUTE OFF – ON
S6 : MIC/LINE SELECTOR MIC – LINE
S7 : PLAY OFF – ON
S8 : STOP OFF – ON
S9 : FF OFF – ON
S10 : REW OFF – ON
S11 : PAUSE OFF – ON
S12 : REC OFF – ON
S13 : ERASE PREVENT DETECTOR NOHOLE – HOLE
S14 : EJECT OFF – ON
S15 : POWER OFF – ON
S16 : TIMER REC/PLAY – OFF – PLAY

The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

Note;

- *This schematic diagram is applicable to serial numbers from ZL3600001 through ZL3600100.*
- *The mother assembly was modified of which serial numbers are after ZL3600101. For detailed, refer to the additional service manual on page 45.*



SWITCHES:

S1 : REC/PLAYBACK — PLAYBACK – REC
S2 : DOLBY NR — OFF – ON
S3 : TAPE SELECTOR — Fe-Cr – STD – Hi
S4 : TAPE SELECTOR — CrO_2 – METAL
S5 : REC MUTE — OFF – ON
S6 : MIC/LINE SELECTOR — MIC – LINE

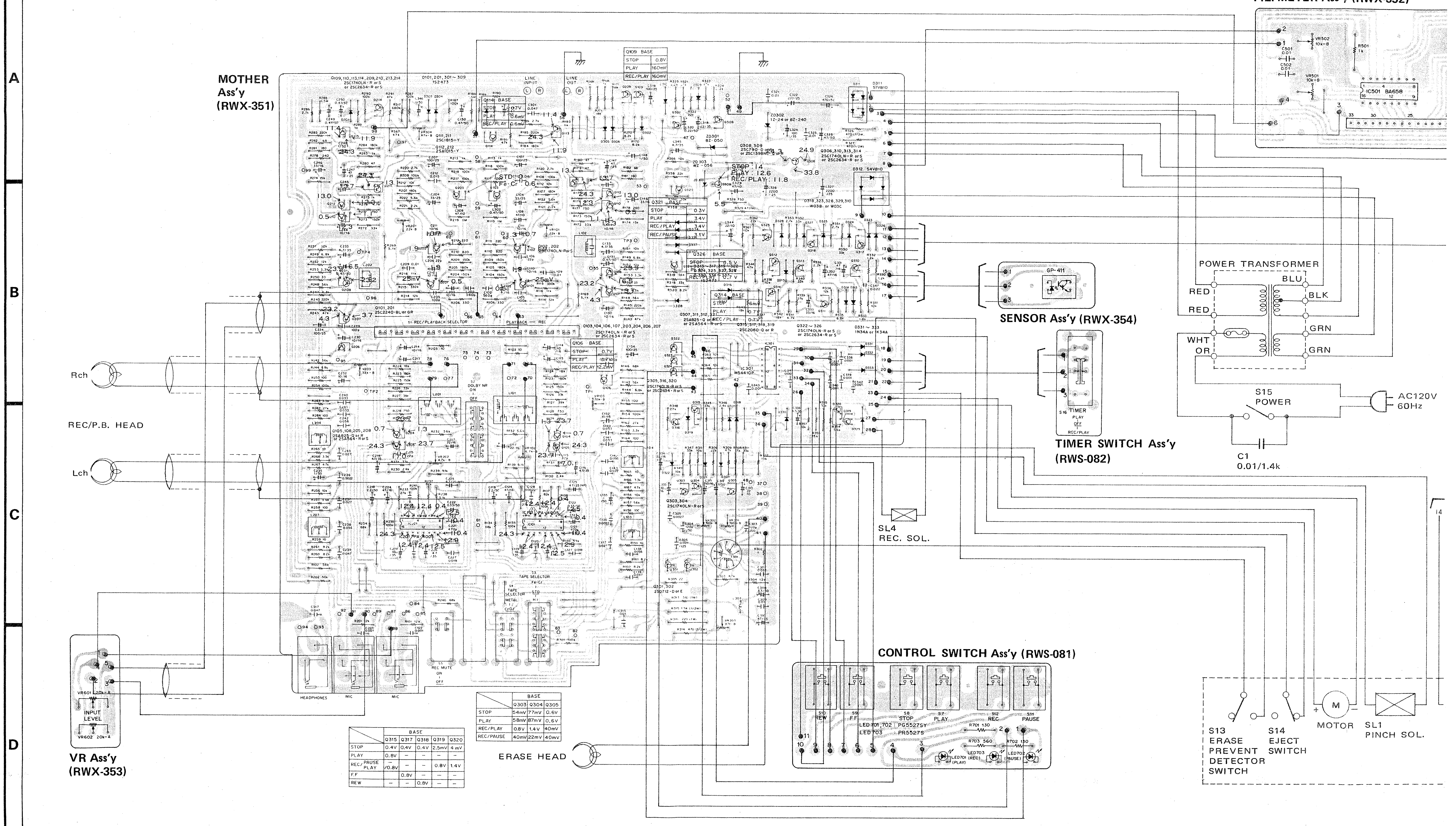
S7 : PLAY — OFF – ON
S8 : STOP — OFF – ON
S9 : FF — OFF – ON
S10 : REW — OFF – ON
S11 : PAUSE — OFF – ON
S12 : REC — OFF – ON
S13 : ERASE PREVENT DETECTOR — NOHOLE – HOLE

S14 : EJECT — OFF – ON
S15 : POWER — OFF – ON
S16 : TIMER — REC/PLAY – OFF – PLAY

The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

10.3 P.C. BOARD CONNECTION DIAGRAM


MOTHER Ass'y (RWX-351)
F.L. METER Ass'y (RWX-352)
IC501 BA658
SENSOR Ass'y (RWX-354)
GP-411
TIMER SWITCH Ass'y (RWS-082)
S16 TIMER
PLAY
OFF
REC/PLAY
POWER TRANSFORMER
RED
RED
WHT
OR
BLU
BLK
GRN
GRN
S15 POWER
AC120V 60Hz
C1 0.01/1.4k
Rch
REC/P.B. HEAD
Lch
SL4 REC. SOL.
CONTROL SWITCH Ass'y (RWS-081)
S10 REW
S9 FF
S8 STOP
S7 PLAY
S12 REC
S11 PAUSE
LED701,702 : PG5527SY
LED703 : PR5527S
LED701 (PLAY)
LED703 (REC)
LED702 (PAUSE)
ERASE HEAD
S13 ERASE PREVENT DETECTOR SWITCH
S14 EJECT SWITCH
MOTOR
SL1 PINCH SOL.
VR Ass'y (RWX-353)
VR601 20k-A
INPUT LEVEL
VR602 20k-A
HEADPHONES
MIC
MIC
S5 REC MUTE ON OFF
S2 DOLBY NR ON OFF
S3 TAPE SELECTOR
S4 TAPE SELECTOR
IC301 M54410P
IC101 PA4005
IC201 PA4005

Q109 BASE	
STOP	0.8V
PLAY	160mV
REC/PLAY	160mV

Q114 BASE	
STOP	0.7V
PLAY	0.6mV
REC/PLAY	0.6mV

Q321 BASE	
STOP	0.3V
PLAY	3.4V
REC/PLAY	3.4V
REC/PAUSE	3.1V

Q106 BASE	
STOP	0.7V
PLAY	0.7V
REC/PLAY	12.2mV

Q314 BASE	
STOP	6mV
PLAY	0.7V
REC/PLAY	0.7V

	BASE		
	Q303	Q304	Q305
STOP	54mV	77mV	0.6V
PLAY	58mV	87mV	0.6V
REC/PLAY	0.8V	1.4V	40mV
REC/PAUSE	40mV	22mV	40mV

	BASE				
	Q315	Q317	Q318	Q319	Q320
STOP	0.4V	0.4V	0.4V	2.5mV	4 mV
PLAY	0.8V	–	–	–	–
REC/ PAUSE / PLAY	– /0.8V	–	–	0.8V	1.4V
F.F		0.8V	–	–	–
REW	–	–	0.8V	–	–

CT-F615

F.L. METER Ass'y (RWX-352)

SENSOR Ass'y (RWX-354)

TIMER SWITCH Ass'y (RWS-082)

CONTROL SWITCH Ass'y (RWS-081)

SL4 REC. SOL.

POWER TRANSFORMER

S15 POWER

AC120V 60Hz

C1 0.01/1.4k

S13 ERASE PREVENT DETECTOR SWITCH

S14 EJECT SWITCH

MOTOR

SL1 PINCH SOL.

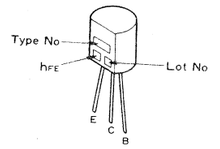
SL2 F.F. SOL.

SL3 REW. SOL.

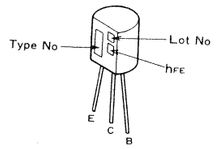
MECHANISM Ass'y

Appearance of Transistors and ICs

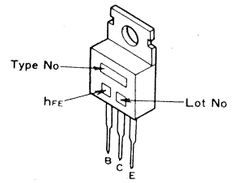
2SA564
2SA825
2SC2634



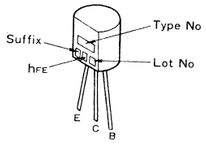
2SA1015
2SC1815
2SC2240



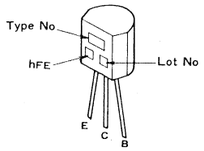
2SC790
2SC1398
2SD837



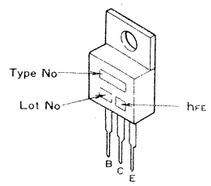
2SC1740LN



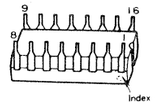
2SC2060



2SD712



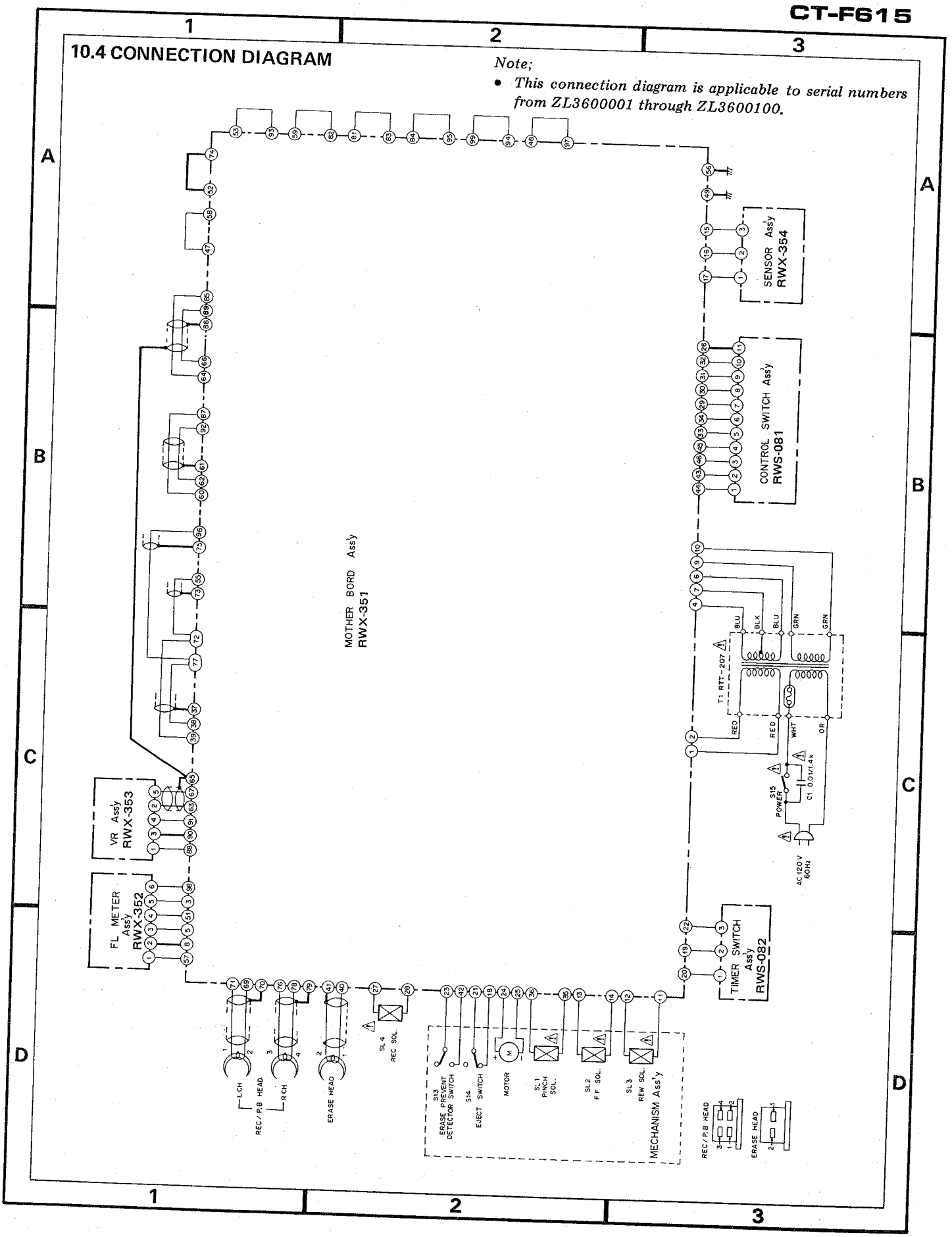
BA658
PA4005
M54410P
BA843



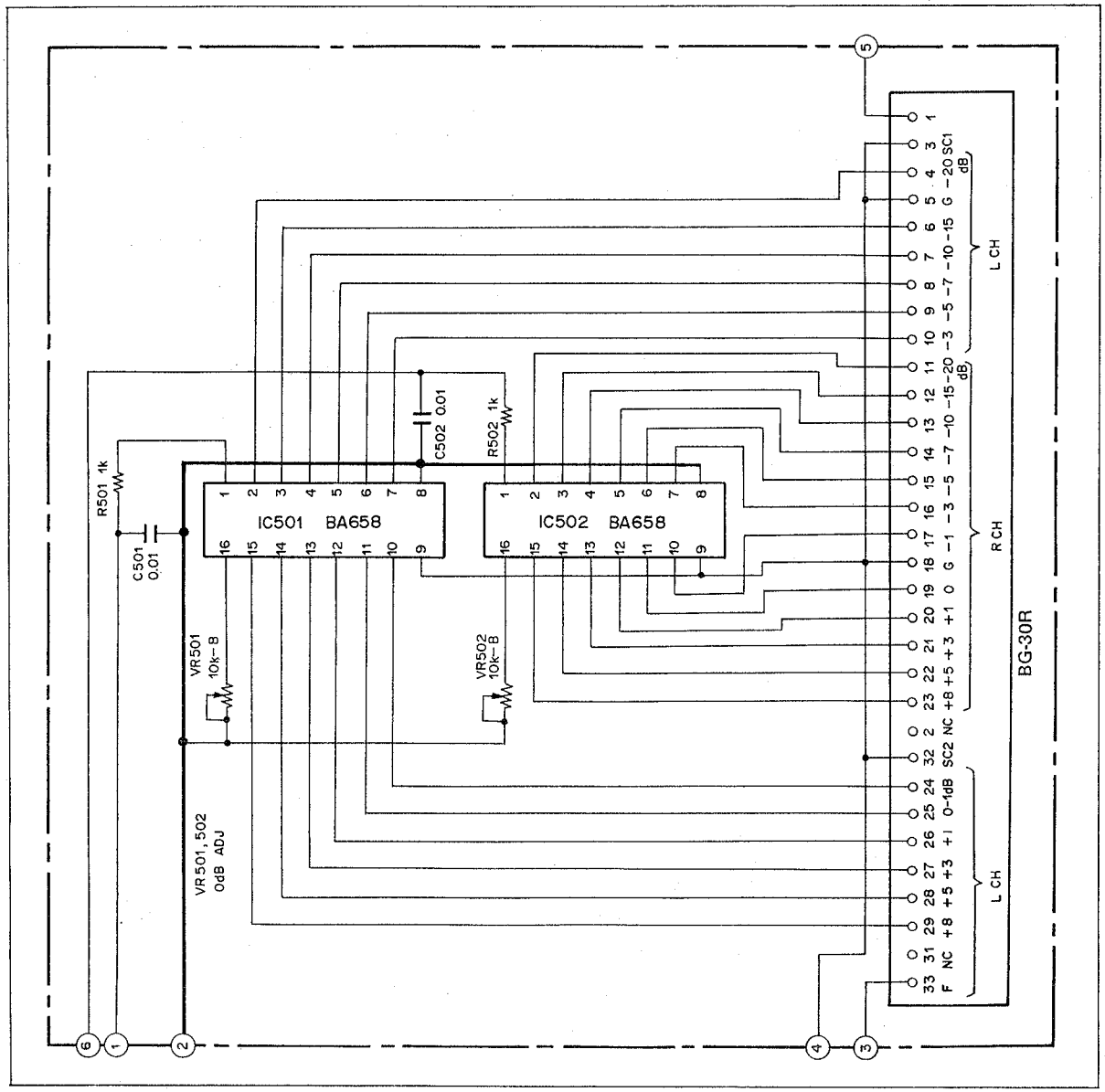
10.4 CONNECTION DIAGRAM

Note;

- *This connection diagram is applicable to serial numbers from ZL3600001 through ZL3600100.*



10.5 F.L. METER ASSEMBLY (RWX-352)



Parts List

CAPACITORS

Part No.	Symbol & Description
CKDYF 103Z 50	C501, C502

SEMICONDUCTORS

Part No.	Symbol & Description
BA658	IC501, IC502

RESISTORS

Part No.	Symbol & Description
C92-049	VR501, VR502
RD¼PS 102J	R501, R502

OTHER

Part No.	Symbol & Description
BG-30R	Fluorescent indicator tube

10.6 MOTHER ASSEMBLY (RWX-351)

Parts List of Mother Assembly

Note;
This mother assembly is applicable to serial numbers from ZL3600001 through ZL3600100.

SWITCHES

Part No.	Symbol & Description	
RSH-049	S1	Slide switch
RSH-053	S2	Slide switch W
RSK-058	S3	Lever switch A
RSK-059	S4	Lever switch B
RSK-060	S5	Lever switch C
RSK-061		Lever switch W

TRANSFORMERS AND COILS

Part No.	Symbol & Description	
RTF-040	L101, L201	MPX filter block
RTF-055	L102, L202	Trap coil
RTF-073	L103, L203	Peaking coil
RTF-074	L104, L204	Peaking coil
RTF-057	L301	Line coil
RTD-017	T301	Oscillation transformer

CAPACITORS

Part No.	Symbol & Description
CQMA 102K 50	C101, C201
CEA 471P 50	C326
CEA 470P 50	C325
CEA 010P 50	C135, C148, C235, C248, C312, C346
CEA 3R3P 50	C308
CEA 2R2P 50	C118, C218
CEA R47P 50	C131, C149, C150, C231, C249, C250, C302
CEA 101P 50	C324
CEA 220P 35	C318
CEA 100P 35	C116, C119, C216, C219, C233
CEA 4R7P 35	C126, C226, C336, C345
CEA 222P 25	C327, C328
CEA 221P 25	C322
CEA 101P 25	C107, C134, C207, C234, C319
CEA 470P 25	C147, C247, C310
CEA 330P 25	C104, C204
CEA 470P 16	C124, C224, C331, C332
CEA 330P 16	C146, C246, C333
CEA 220P 16	C117, C217, C334
CEA 100P 16	C110, C111, C113, C114, C130, C132, C144, C145, C210, C211, C213, C214, C230, C232, C244, C245, C345
CEA 470P 10	C108, C208, C329, C330
CEA 220P 10	C313, C344
CEANL 100P 16	C103, C203
CEA 100M 16	C335
CEA R22M 50	C320
CEA R33M 50	C122, C222
CEA 010M 50	C123, C223
CEA 4R7M 25NP	C125, C225
CQMA 563K 50	C138, C142, C238, C242
CQMA 473K 50	C139, C239
CQMA 333K 50	C140, C141, C240, C241, C307
CQMA 273K 50	C137, C143, C237, C243
CQMA 183K 50	C127, C227
CQMA 153K 50	C112, C212
CQMA 123K 50	C120, C220
CQMA 103K 50	C109, C209
CQMA 222K 50	C128, C136, C228, C236
CQSA 272J 250	C305
CQSA 102J 125	C306
CQSA 121K 250	C303, C304
RCE-021	C102, C202
CKDYF 473Z 50	C301, C317
CKDTF 103Z 50	C309, C314–C316, C321, C323
CKDYF 102Z 50	C337–C343
CCDSL 101K 50	C105, C129, C205, C229
CCDSL 220K 50	C106, C115, C206, C215
CKDYB 471K 50	C121, C221

RESISTORS

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Part No.	Symbol & Description		
C92-857	VR101, VR201	Semi-fixed	22k-B
C92-051	VR102, VR202	Semi-fixed	4.7k-B
C81-426	VR103, VR203	Semi-fixed	33k-B
C92-047	VR301, VR302	Semi-fixed	100k-B
C92-048	VR304	Semi-fixed	47k-B
RCP-022	VR303	Semifixed	470-B
RD¼PM □□□J	R101-R135, R137-R191, R201-R235, R237-R291, R301-R309, R311, R312, R317-R325, R328, R330-R367		
⚠ RS1PF□□□J	R331, R316, R329		
RD½PSF□□□J	R314, R315, R326, R327		

SEMICONDUCTORS

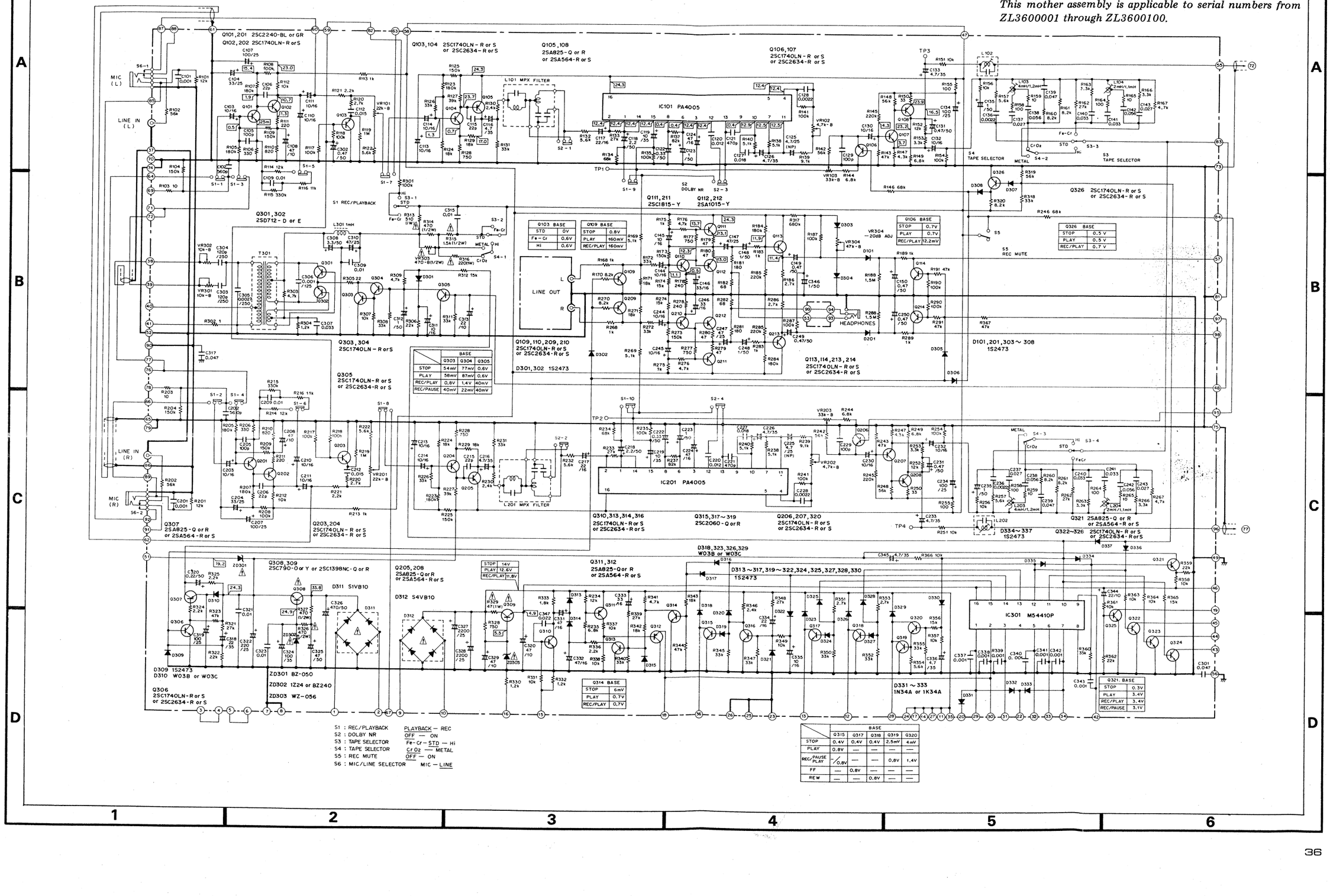
Part No.	Symbol & Description
2SC2240	Q101, Q201
⚠ 2SC1740LN	Q102, Q202, Q303, Q304
2SC1740LN (2SC2634)	Q103, Q104, Q106, Q107, Q109, Q110, Q113, Q114, Q203, Q204, Q206, Q207, Q209, Q210, Q213, Q214, Q305, Q306, Q310, Q313, Q314, Q316, Q320, Q322–Q326
2SC1815	Q111, Q211
2SA1015	Q112, Q212
2SA825	Q105, Q108, Q205, Q208, Q307, Q311, Q312, Q321
⚠ 2SC1398NC (2SC790)	Q308, Q309
2SD712	Q301, Q302
2SC2060	Q315, Q317–Q319
PA4005	IC101, IC201
M54410P	IC301
1S2473	D101, D201, D301–D309, D313–D317 D319–D322, D324, D325, D327, D328, D330, D334–D337
W03B (W03C)	D310, D318, D323, D326, D329
1N34A (1K34A)	D331–D333
⚠ S4VB10	D312
⚠ S1VB10	D311
⚠ BZ-050	ZD301
⚠ 1Z-24 (BZ-240)	ZD302
⚠ WZ-056	ZD303

OTHERS

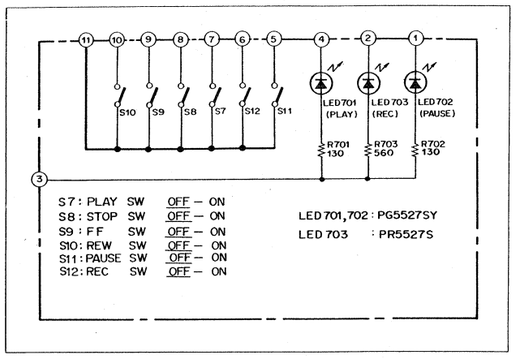
Part No.	Symbol & Description
RKN-059	MIC jack
RKN-060	Headphones jack
RKB-014	4P mount pin jack
RSX-046	Flex wire

Mother Assembly (RWX-351)

Note;
This mother assembly is applicable to serial numbers from ZL3600001 through ZL3600100.



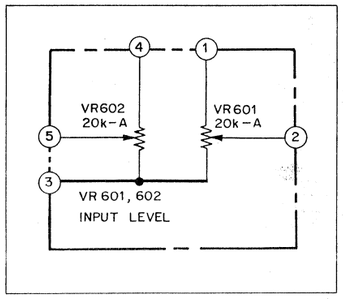
10.7 FUNCTION SWITCH ASSEMBLY (RWS-081)



Parts List

Part No.	Symbol & Description	
RSG-088	S7–S12	Push switch
PG5227SY	LED701, LED702	Light emitting diode (green)
PR5227S	LED703	Light emitting diode (red)
RD ¼ 131J	R701, R702	
RD ¼ PM 561J	R703	

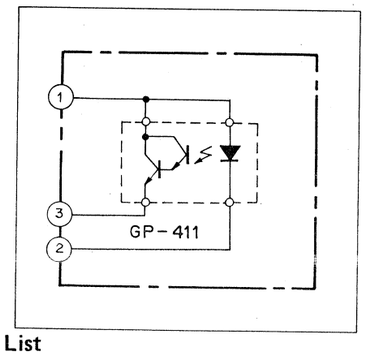
10.8 VOLUME ASSEMBLY (RWX-353)



Parts List

Part No.	Symbol & Description
RCV-080	VR601, VR602 Variable resistor

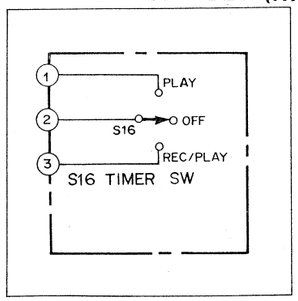
10.9 SENSOR ASSEMBLY (RWX-354)



Parts List

Part No.	Symbol & Description
GP411	

10.10 TIMER SWITCH ASSEMBLY (RWS-082)



Parts List

Part No.	Symbol & Description	
RSH-051	S16	Slide switch

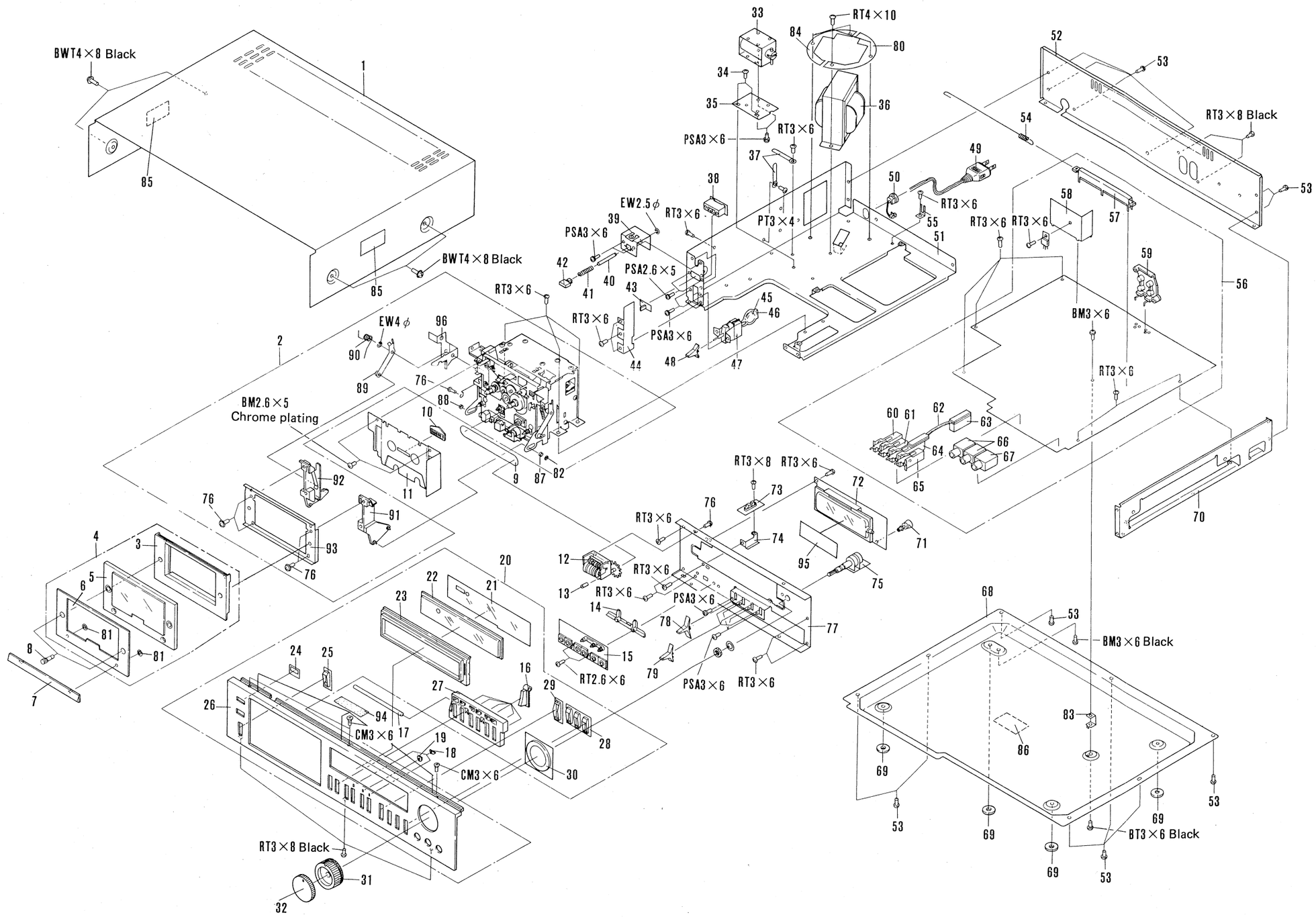
11. EXPLODED VIEWS AND PARTS LIST

11.1 EXTERIOR COMPONENT

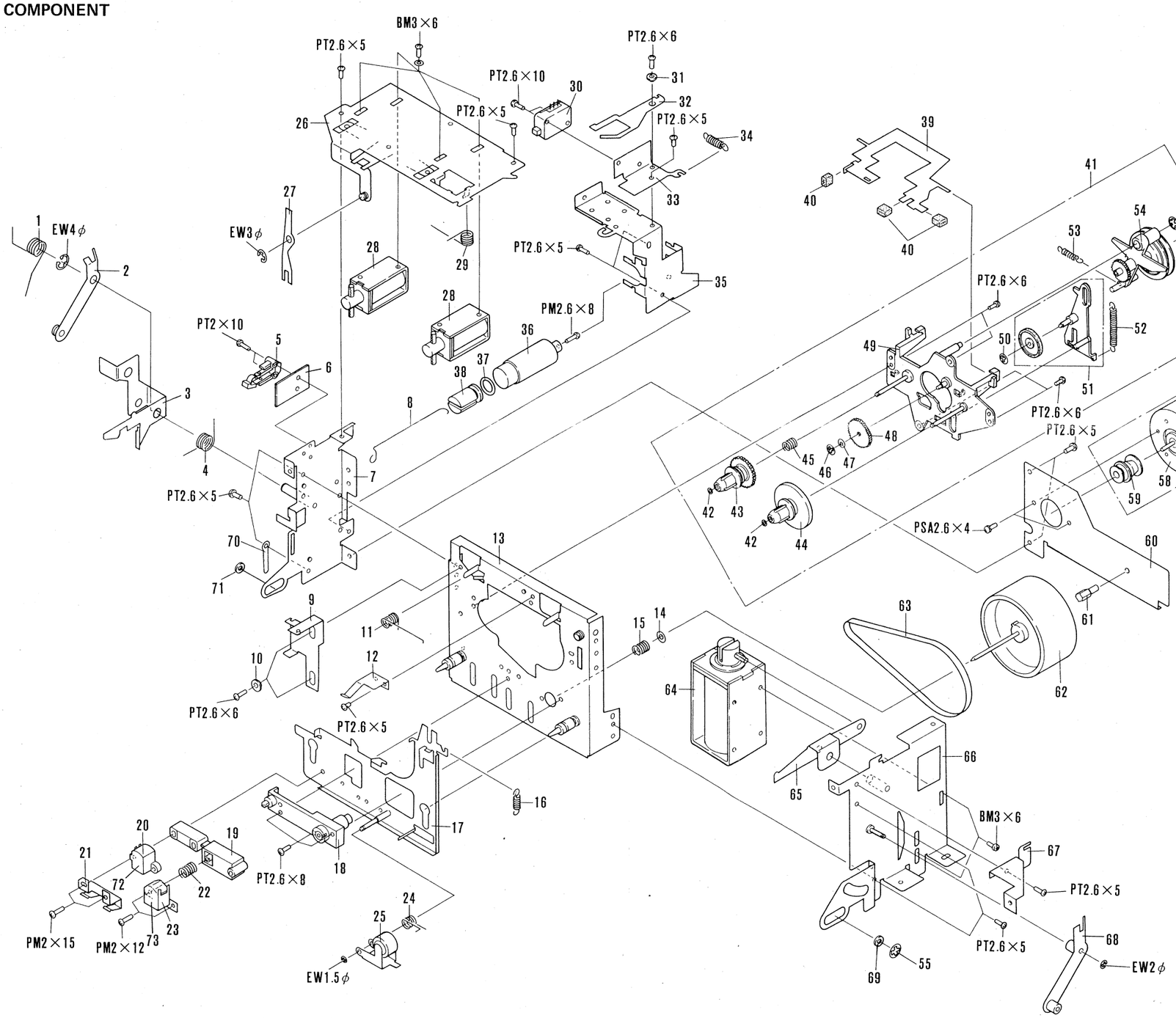
NOTE:
- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*

Parts List

Key No.	Part No.	Description
1.	RNA-462	Bonnet
2.		Mechanism assembly
3.		Frame cover
4.	RXX-274	Pocket door assembly
5.		Pocket door
6.		Door panel
7.		Door emblem
8.	RLB-213	Door fastener
9.	REB-240	Sensing belt
10.	RNK-866	Indicator lens
11.	RAH-325	Cassette plate
12.	RAW-130	Counter
13.	RAC-129	Counter cap
14.		Stud
15.	RWS-081	Function switch assembly
16.	RAC-126	Control knob
17.		Knob shaft
18.		LED cap G
19.		LED cap R
20.	RXX-285	Front panel sub assembly
21.		Meter lens
22.	RNK-902	Front cover
23.		Escutcheon
24.		Eject knob guide
25.		Knob escutcheon B
26.		Front panel
27.		Control knob holder
28.		Escutcheon A
29.		Escutcheon B
30.		VR plate
31.	RAA-319	Knob B
32.	RAA-318	Knob A
⚠33.	RXP-085	Solenoid
34.		
35.		Solenoid plate
⚠36.	RTT-207	Power transformer
37.		UL cord clamper
38.	RWS-082	Timer switch assembly
39.		Eject bracket
40.		Eject rod
41.	RBH-665	Eject spring
42.	RAC-128	Eject knob
43.	RAC-127	Stand-by knob
44.		Plate
⚠45.	RCG-006	Capacitor
46.	REC-297	Capacitor cover
⚠47.	RSA-039	Power switch
48.	RAC-124	Lever knob A
⚠49.	RDG-022	Power code
⚠50.	REC-272	Strain relief
51.		Chassis
52.		Rear panel
53.	RBA-057	Screw
54.	RBH-664	REC spring
55.		2P terminal (GND)
56.	RWX-351	Mother assembly
57.	RSH-049	Slide switch
58.		Heat sink
59.	RKB-014	4P mount pin jack
60.	RSK-058	Lever switch A
61.	RSK-059	Lever switch B
62.	RSX-046	Flex wire
63.	RSH-053	Slide switch W
64.	RSK-061	Lever switch W
65.	RSK-060	Lever switch C
66.	RKN-059	MIC jack
67.	RKN-060	Headphonens jack
68.		Bottom plate
69.	REC-291	Stopper
70.		Slide frame
71.		T type rivet
72.	RWX-352	F.L. meter assembly
73.	RWX-354	Sensor assembly
74.		Sensor bracket
75.	RWX-353	VR assembly
76.		TP screw 2.6 x 6
77.		Panel stay
78.	RAC-125	Lever knob B
79.	RAC-124	Lever knob A
80.		Transformer plate R
81.		CS type stopper ring 2ϕ
82.		CS type stopper ring 3ϕ
83.		P.C.B. holder
84.		Transformer plate L
85.	RRW-112	UL caution label A
86.		UL caution label B
87.		Collar
88.		Collar
89.		Door arm (III) assembly
90.	RBH-660	Spring
91.	RXB-277	Cassette holder R assembly
92.	RXB-276	Cassette holder L assembly
93.	RNA-456	Pocket frame
94.	REB-394	Cover cushion H
95.	REB-397	Cover cushion M
96.		Eject lever


BWT4×8 Black
1
85
BWT4×8 Black
85
2
EW4φ
96
90
89
76
88
10
BM2.6×5
Chrome plating
11
92
91
93
76
76
4
3
5
6
81
81
8
7
RT3×6
33
34
35
RT4×10
84
80
36
PSA3×6
RT3×6
37
38
EW2.5φ
RT3×6
39
PSA3×6
42
41
40
PSA2.6×5
43
RT3×6
44
45
46
PSA3×6
48
47
PT3×4
50
49
RT3×6
55
51
52
53
RT3×8 Black
54
53
58
57
RT3×6
RT3×6
59
56
BM3×6
RT3×6
60
61
62
63
64
66
67
65
RT3×8
RT3×6
73
72
74
71
95
75
76
RT3×6
12
RT3×6
13
RT3×6
14
PSA3×6
78
77
15
RT2.6×6
79
PSA3×6
RT3×6
9
87
82
70
20
22
21
23
24
25
16
27
29
26
94
CM3×6
17
19
18
CM3×6
28
30
RT3×8 Black
31
32
68
53
BM3×6 Black
83
86
69
53
69
53
69
BT3×6 Black
69
53

11.2 INTERIOR COMPONENT

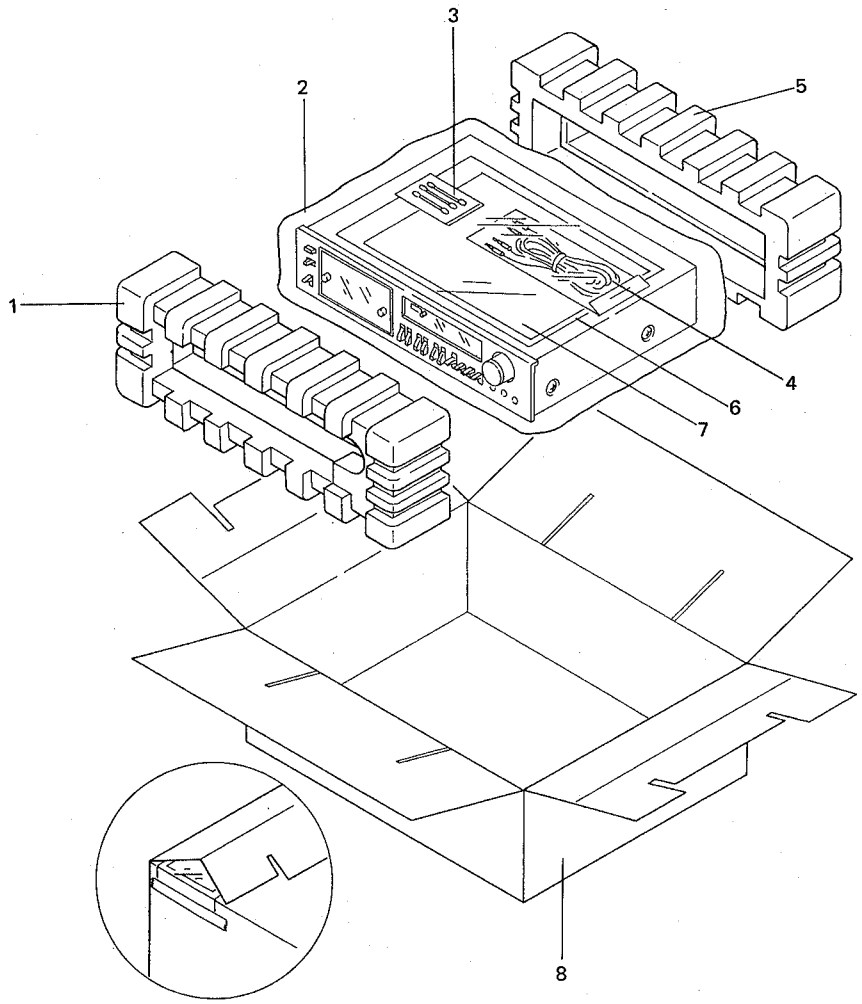


Parts List

Key No.	Part No.	Description
1.	RBH-660	Coil spring
2.		Door arm (II) assembly
3.		Eject lever
4.	RBH-653	Coil spring
5.	RSN-029	Switch
6.		Switch sheet
7.		Side plate L assembly
8.	RBH-662	Joint bar
9.		REC plate assembly
10.		Pause lever collar B
11.	RBH-657	Torsion coil spring
12.	RBK-145	Cassette holder
13.		Main chassis assembly
14.		
15.	RBH-659	T tension spring
16.	RBH-652	Tension coil spring
17.		Head chassis assembly
18.	RXB-262	Bearing assembly
19.	RNK-884	Head plate
20.	PPB-056	Erase head
21.		Wire holder
22.	RBH-650	Compression coil spring
23.	RPB-070	REC/P.B. head
24.	RBH-651	Torsion coil spring
25.	RXB-264	Pinch arm assembly
26.		Solenoid chassis assembly
27.		FR lever
⚠ 28.	RXP-084	Solenoid
29.	RBH-658	Torsion coil spring
30.	RSH-054	Slide switch
31.	RLB-210	Collar
32.		Lock lever
33.		Switch mount plate
34.	RBH-663	Tension coil spring
35.		Mount plate B
36.	RNK-897	Cylinder
37.	REB-379	O ring
38.	RNK-898	Piston
39.		Brake plate
40.	REB-380	Brake rubber
41.	RXB-269	Reel assembly
42.		
43.	RXB-271	S reel base assembly
44.	RXB-272	T reel base assembly
45.	RBH-654	S brake spring
46.		CS ring
47.		Washer
48.	RNK-887	Idler gear
49.		Reel base assembly
50.		CS ring
51.	RXB-273	Idler arm assembly
52.	RBH-655	Tension coil spring
53.		Tension coil spring
54.	RXB-274	Drive arm assembly
55.		CS type stopper
56.	REB-378	Belt
57.	* RXB-279	Motor assembly
58.		Motor
59.		Motor pulley
60.		Motor holder
61.		Thrust screw
62.	RNG-243	Fly wheel
63.	REB-377	Belt
⚠ 64.	RXP-083	Solenoid
65.		Play lever
66.		Side plate R assembly
67.		Mount plate A
68.		Door arm (I) assembly
69.		Collar
70.		UL cord clamper
71.		Collar
72.	RRW-081	E head label
73.	PRW-109	R/P head label

* Motor pulley can not be remove from the motor. The motor and motor pulley can be supplied as motor assembly.

12. PACKING



Parts List

Key No.	Part No.	Description
1.	RHA-199	Front pad
2.	RHL-050	Vinyl bag
3.	REA-021	Head cleaning assembly
4.	RDE-032	Connection code assembly
5.	RHA-200	Rear pad
6.	RHL-018	Vinyl bag (for operating instructions)
7.	RRB-127	Operating instructions (Serial No. ZL3600001~ZL3600100)
	RRB-130	Operating instructions (Serial No. ZL3600101~)
8.	RHG-333	Packing case

ADDITIONAL

Service Manual

PIONEER®

CASSETTE TAPE DECK

CT-F615 KU

NOTE;

- This additional service manual is applicable to the CT-F615 of which serial numbers are after ZL3600101.
- As improvement, the mother assembly was modified, the circuitly of other assemblies, circuit descriptions, exploded views and adjustment are same as the CT-F615 of which serial numbers from ZL3600001 through ZL3600100.
- The assemblies before the modification and after modification are interchangeable.

Contrast Parts List of Assembly

Description	Part No.		Remarks
	Serial No. ZL 3600001 ~ ZL3600100	Serial No. ZL 3600101 ~	
Mother assembly	RWX-351	RWX-383	
F.L. meter assembly	RWX-352	RWX-384	
Function switch assembly	RWS-081	RWS-088	
Sensor assembly	RWX-354	RWX-386	
Timer switch assembly	RWS-082	RWS-089	
Volume assembly	RWX-353	RWX-385	

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
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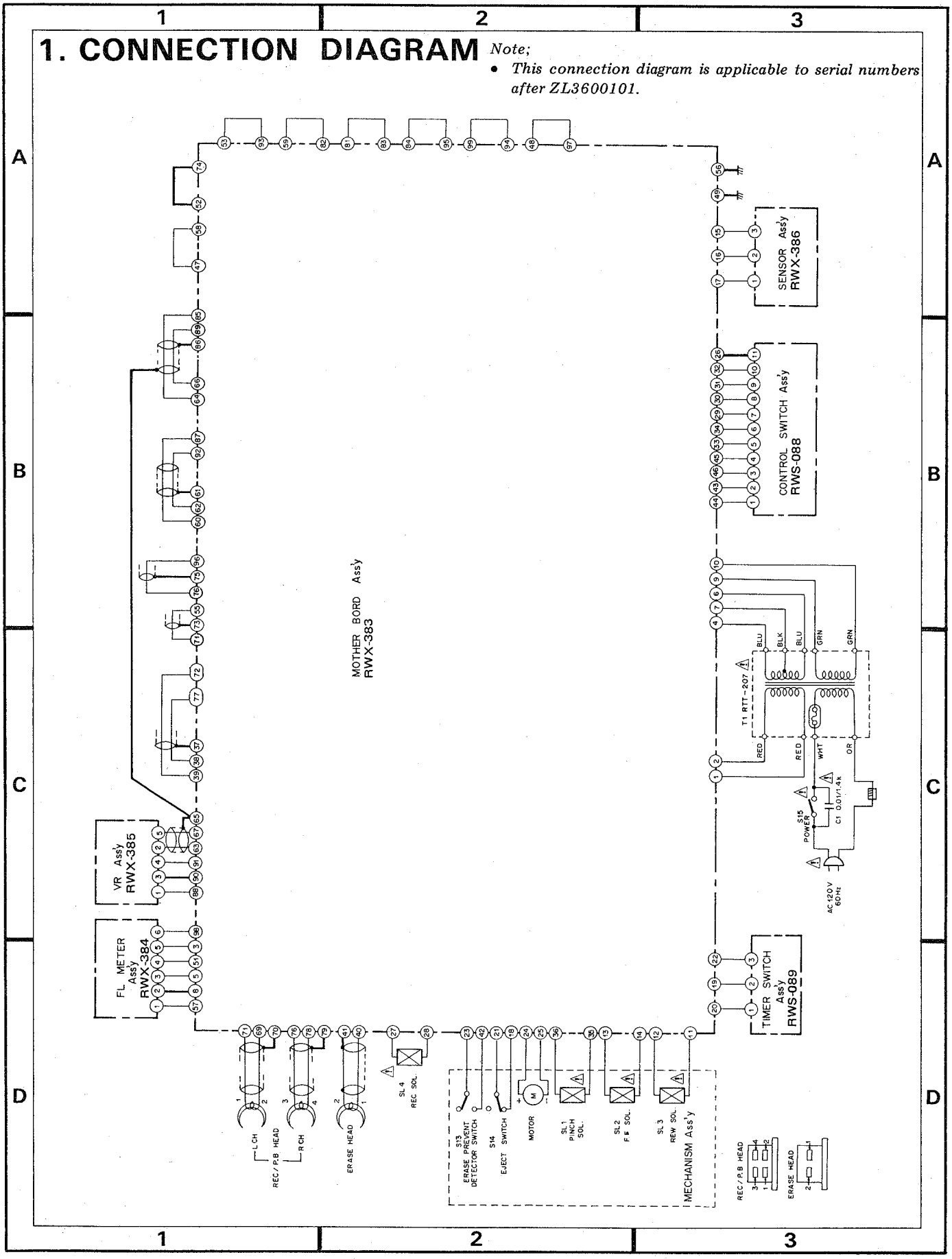
PIONEER ELECTRONIC (EUROPE) N.V. Luithagen-Haven 9, 2030 Antwerp, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia

1. CONNECTION DIAGRAM

Note;

- *This connection diagram is applicable to serial numbers after ZL3600101.*



2. MOTHER ASSEMBLY

Part List of Mother Assembly (RWX-383)

SWITCHES

Part No.	Symbol & Description	
RSH-049	S1	Slide switch
RSH-053	S2	Slide switch W
RSK-058	S3	Lever switch A
RSK-059	S4	Lever switch B
RSK-060	S5	Lever switch C
RSK-061		Lever switch W

TRANSFORMERS AND COILS

Part No.	Symbol & Description	
RTF-040	L101, L201	MPX filter block
RTF-055	L102, L202	Trap coil
RTF-073	L103, L203	Peaking coil
RTF-074	L104, L204	Peaking coil
RTF-057	L301	Line coil
RTD-017	T301	Oscillation transformer

CAPACITORS

Part No.	Symbol & Description
CQMA 102K 50	C101, C201
CEA 471P 50	C326
CEA 470P 50	C325
CEA 010P 50	C135, C148, C235, C248, C312, C346
CEA 2R2P 50	C118, C218
CEA R47P 50	C131, C149, C150, C231, C249, C250, C302
CEA 101P 50	C324
CEA 220P 35	C318
CEA 100P 35	C119, C219, C310
CEA 4R7P 35	C116, C126, C133, C216, C226, C233, C308, C336, C345
CEA 222P 25	C327, C328
CEA 221P 25	C322
CEA 101P 25	C107, C134, C207, C234, C319, C314, C316
CEA 470P 25	C147, C247
CEA 330P 25	C104, C204
CEA 470P 16	C124, C224, C331, C332
CEA 330P 16	C146, C246, C333
CEA 220P 16	C117, C217, C334
CEA 100P 16	C110, C111, C113, C114, C130, C132, C144, C145, C210, C211, C213, C214, C230, C232, C244, C245, C311
CEA 470P 10	C108, C208, C329, C330
CEA 220P 10	C313, C344
CEANL 100P 16	C103, C203
CEA 100M 16	C335
CEA R22M 50	C320

Note;

- *This mother assembly is applicable to serial numbers after ZL3600101.*

Part No.	Symbol & Description
CEA R33M 50	C122, C222
CEA 010M 50	C123, C223
CEA 4R7M 25NP	C125, C225
CQMA 563K 50	C138, C142, C238, C242
CQMA 473K 50	C139, C239
CQMA 333K 50	C140, C141, C240, C241, C307
CQMA 273K 50	C137, C143, C237, C243
CQMA 183K 50	C127, C227
CQMA 153K 50	C112, C212
CQMA 123K 50	C120, C220
CQMA 103K 50	C109, C209
CQMA 222K 50	C128, C136, C228, C236
CQSA 272J 250	C305
CQSA 102J 125	C306
CQSA 121K 250	C303, C304
RCE-018	C102, C202
CKDYF 473Z 50	C301, C317
CKDTF 103Z 50	C309, C315, C321, C323
CKDYF 102Z 50	C337–C343
CCDSL 101K 50	C105, C129, C205, C229
CCDSL 220K 50	C106, C115, C206, C215
CKDYB 471K 50	C121, C221

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

Part No.	Symbol & Description		
C92-857	VR101, VR201	Semi-fixed	22k-B
C92-051	VR102, VR202	Semi-fixed	4.7k-B
C81-426	VR103, VR203	Semi-fixed	33k-B
C92-047	VR301, VR302	Semi-fixed	100k-B
C92-048	VR304	Semi-fixed	47k-B
RCP-022	VR303	Semifixed	470-B
RD¼PM □□□J	R101-R135, R137-R191, R201-R235, R237-R291, R301-R309, R311, R312, R317-R326, R328, R330-R367		
⚠ RS1PF□□□J	R313, R316, R329		
RD½PSF □□□J	R314, R315, R326		
⚠ RD¼PSF □□□J	R155, R255		
⚠ RD½PSF □□□J	R327		

SEMICONDUCTORS

Part No.	Symbol & Description
2SC2240	Q101, Q201
⚠ 2SC1740LN	Q102, Q202, Q303, Q304, Q327
2SC1740LN (2SC2634)	Q103, Q104, Q106, Q107, Q109, Q110, Q113, Q114, Q203, Q204, Q206, Q207, Q209, Q210, Q213, Q214, Q305, Q306, Q310, Q313, Q314, Q316, Q320, Q322 Q326
2SC1815	Q111, Q211
2SA1015	Q112, Q212
2SA825 (2SA564)	Q105, Q108, Q205, Q208, Q307, Q311, Q312, Q321
⚠ 2SC1398NC (2SC790)	Q309
2SD712	Q301, Q302
2SC2060	Q315, Q317–Q319
⚠ 2SD837	Q308
PA4005	IC101, IC201
BA843	IC301
1S2473	D101, D201, D301–D309, D313–D317 D319–D322, D324, D325, D327, D328, D330, D334–D339
W03B (W03C)	D310, D318, D323, D326, D329
1N34A (1K34A)	D331–D333
⚠ S3VB10	D312
⚠ S1VB10	D311
⚠ BZ-050	ZD301
⚠ WZ-250	ZD302
⚠ WZ-056	ZD303

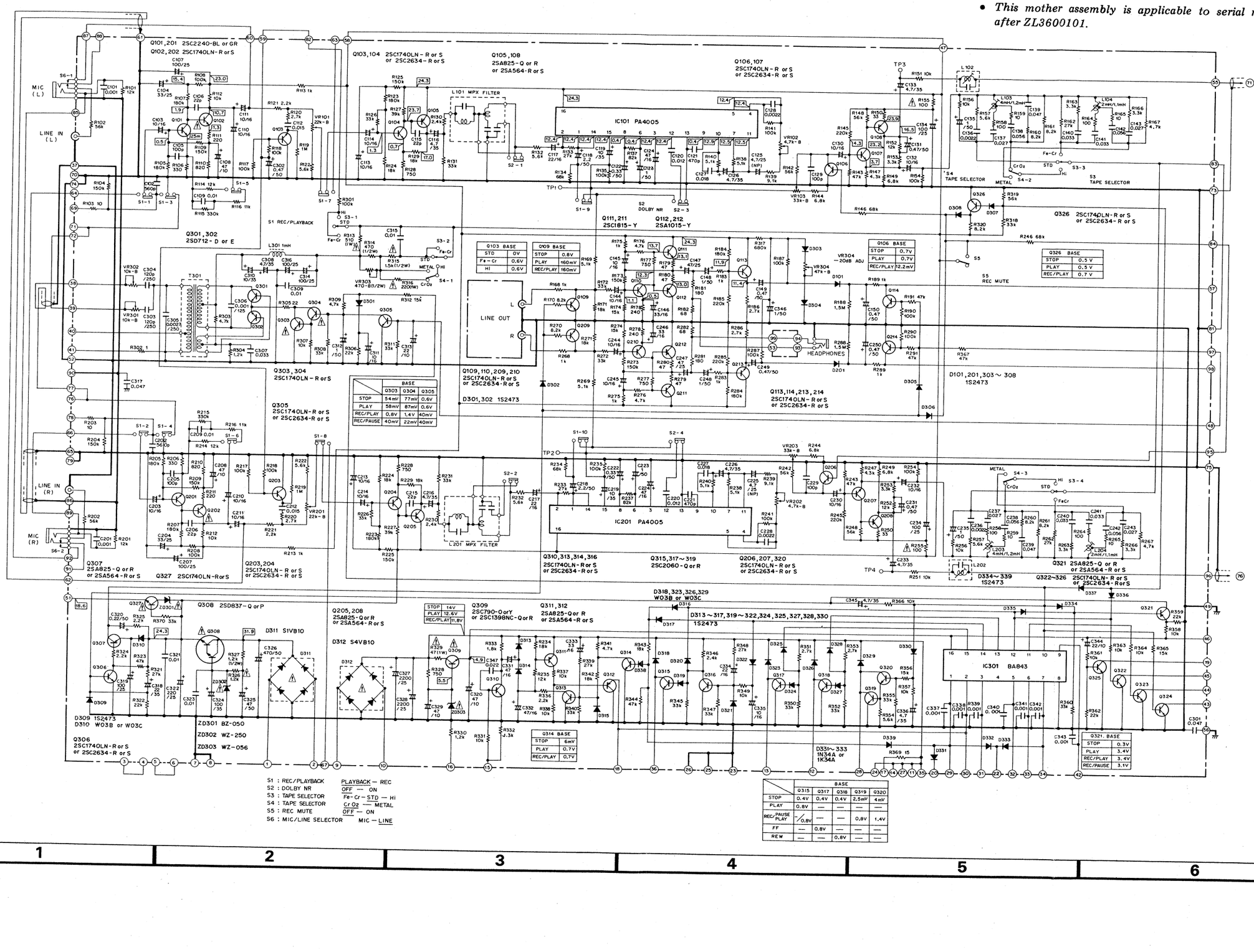
OTHERS

Part No.	Symbol & Description
RKN-059	MIC jack
RKN-060	Headphones jack
RKB-014	4p mount

Mother Assembly (RWX-383)

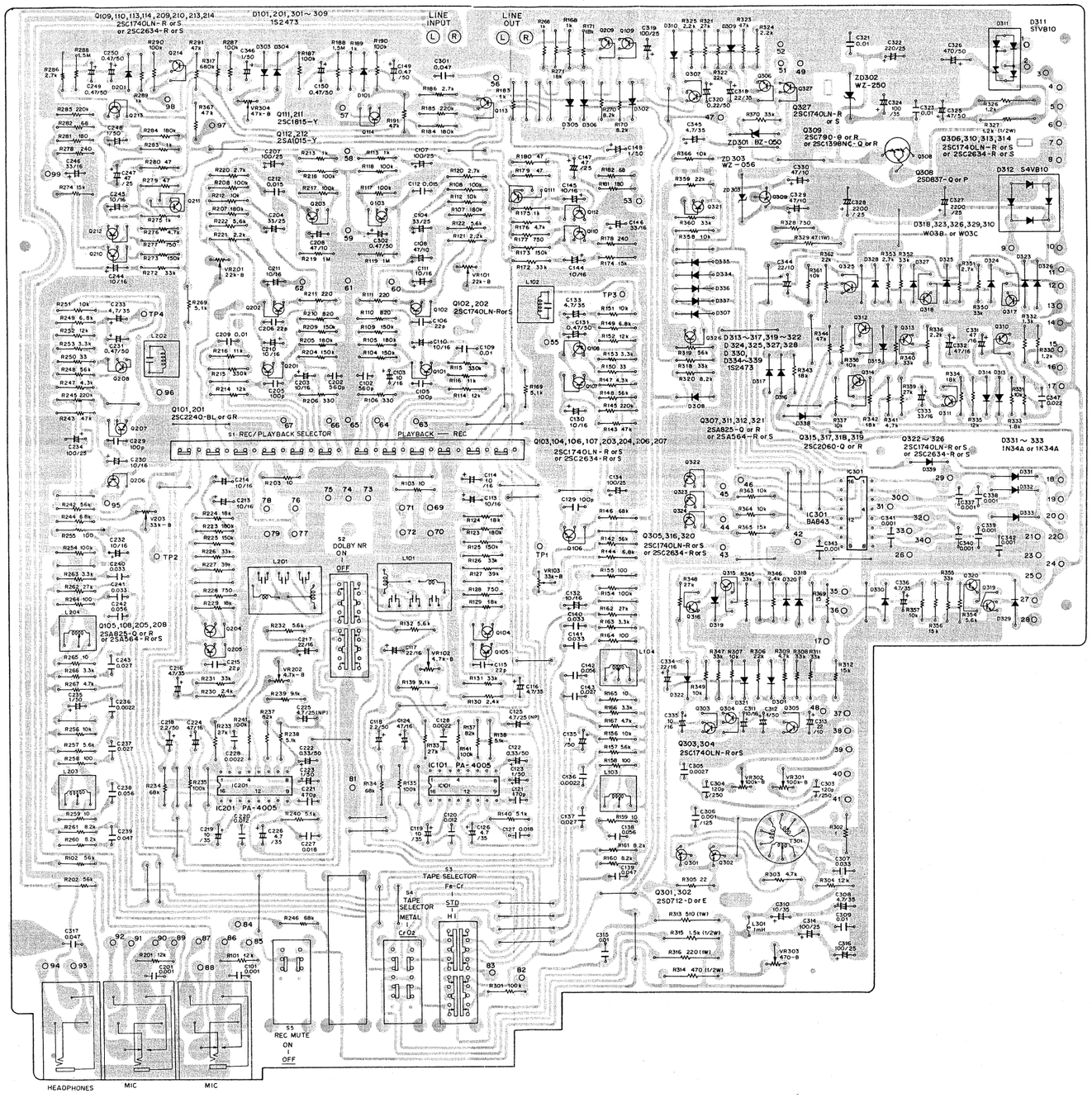
Note;

- *This mother assembly is applicable to serial numbers after ZL3600101.*

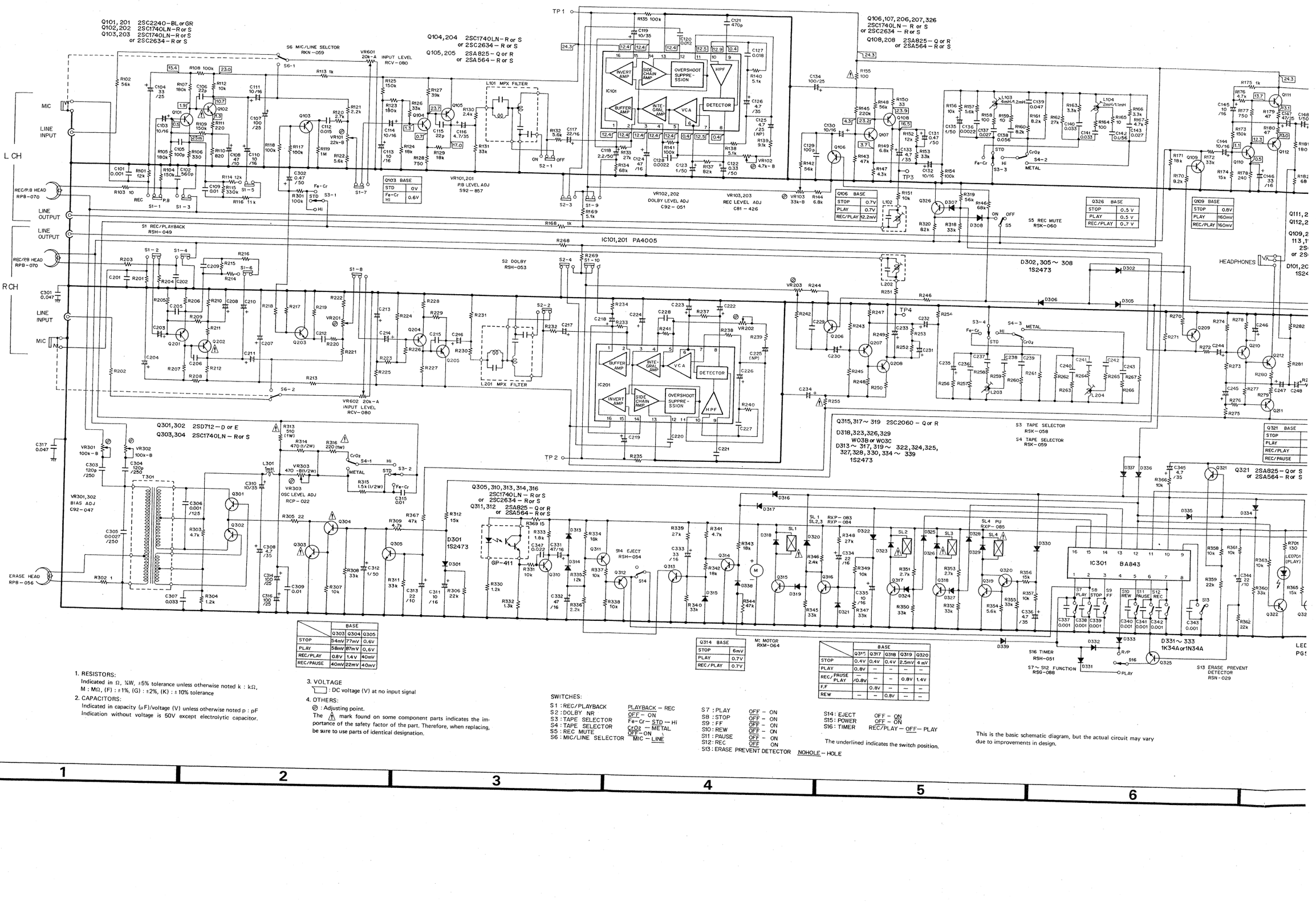


Mother Assembly (RWX-383)

Foil Side



3. SCHEMATIC DIAGRAM


Q101, 201 2SC2240 – BL or GR
Q102, 202 2SC1740LN – R or S
Q103, 203 2SC1740LN – R or S
or 2SC2634 – R or S
Q104, 204 2SC1740LN – R or S
or 2SC2634 – R or S
Q105, 205 2SA825 – Q or R
or 2SA564 – R or S
Q106, 107, 206, 207, 326
2SC1740LN – R or S
or 2SC2634 – R or S
Q108, 208 2SA825 – Q or R
or 2SA564 – R or S
S6 MIC/LINE SELCTOR RKN – 059
VR601 20k – A INPUT LEVEL RCV – 080
VR602 20k – A INPUT LEVEL RCV – 080
L101 MPX FILTER
L201 MPX FILTER
IC101, 201 PA4005
IC101
IC201
INVERT AMP
SIDE CHAIN AMP
OVERSHOOT SUPPRESSION
BUFFER AMP
INTEGRAL AMP
VCA
DETECTOR
HPF
MIC
LINE INPUT
REC/P.B HEAD RPB – 070
LINE OUTPUT
L CH
R CH
S1 REC/PLAYBACK RSH – 049
S2 DOLBY RSH – 053
S3 TAPE SELECTOR RSK – 058
S4 TAPE SELECTOR RSK – 059
S5 REC MUTE RSK – 060
VR102, 202 DOLBY LEVEL ADJ C92 – 051
VR103, 203 REC LEVEL ADJ C81 – 426
VR101, 201 PB LEVEL ADJ S92 – 857
VR301, 302 BIAS ADJ C92 – 047
VR303 OSC LEVEL ADJ RCP – 022
ERASE HEAD RPB – 056
HEADPHONES
D302, 305 ~ 308 1S2473
D301 1S2473
D331 ~ 333 1K34A or 1N34A
Q301, 302 2SD712 – D or E
Q303, 304 2SC1740LN – R or S
Q305, 310, 313, 314, 316
2SC1740LN – R or S
or 2SC2634 – R or S
Q311, 312 2SA825 – Q or R
or 2SA564 – R or S
Q315, 317 ~ 319 2SC2060 – Q or R
D318, 323, 326, 329
W03B or W03C
D313 ~ 317, 319 ~ 322, 324, 325, 327, 328, 330, 334 ~ 339
1S2473
Q321 2SA825 – Q or S
or 2SA564 – R or S
IC301 BA843
S7 ~ S12 FUNCTION RSG – 088
S13 ERASE PREVENT DETECTOR RSN – 029
S14 EJECT RSH – 054
S16 TIMER RSH – 051
M: MOTOR RXM – 064
SL1 SL2,3 RXP – 083 RXP – 084
SL4 PU RXP – 085
GP – 411
TP1
TP2
TP3
TP4
Q103 BASE
STD 0V
Fe – Cr HI 0.6V
Q106 BASE
STOP 0.7V
PLAY 0.7V
REC/PLAY 92.2mV
Q326 BASE
STOP 0.5 V
PLAY 0.5 V
REC/PLAY 0.7 V
Q109 BASE
STOP 0.8V
PLAY 160mV
REC/PLAY 160mV
Q321 BASE
STOP
PLAY
REC/PLAY
REC/PAUSE
Q314 BASE
STOP 6mV
PLAY 0.7V
REC/PLAY 0.7V
Q305 BASE
STOP 54mV 77mV 0.6V
PLAY 58mV 87mV 0.6V
REC/PLAY 0.8V 1.4V 40mV
REC/PAUSE 40mV 22mV 40mV
Q315 Q317 Q318 Q319 Q320
STOP 0.4V 0.4V 0.4V 2.5mV 4mV
PLAY 0.8V – – – –
REC/PAUSE /0.8V – – 0.8V 1.4V
F.F 0.8V – – –
REW – – 0.8V – –

1. RESISTORS:
   Indicated in Ω, ¼W, ±5% tolerance unless otherwise noted k : kΩ, M : MΩ, (F) : ±1%, (G) : ±2%, (K) : ± 10% tolerance
2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p : pF
   Indication without voltage is 50V except electrolytic capacitor.
3. VOLTAGE
   ▭ : DC voltage (V) at no input signal
4. OTHERS:
   ⊘ : Adjusting point.
   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

SWITCHES:

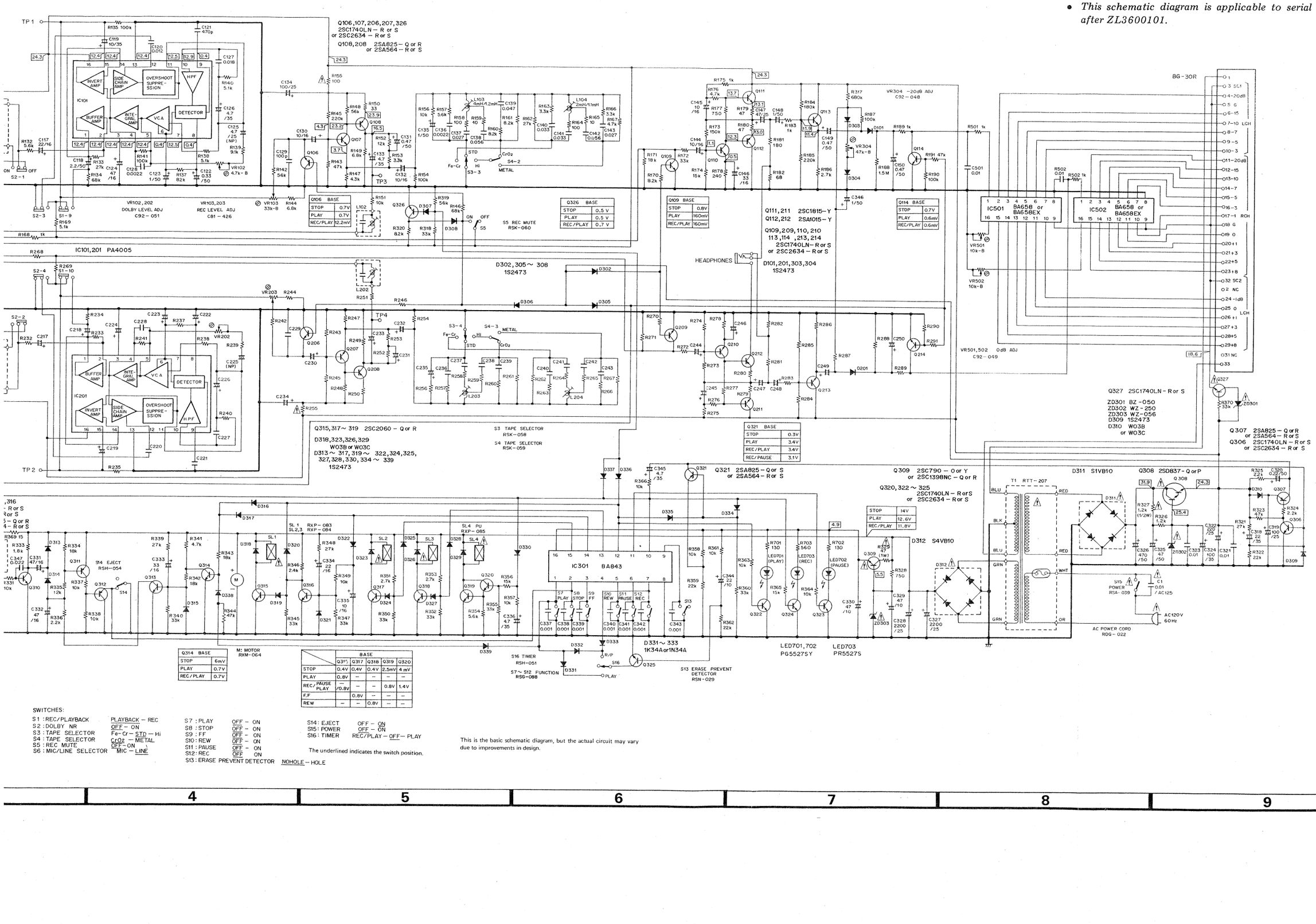
S1 : REC/PLAYBACK PLAYBACK – REC
S2 : DOLBY NR OFF – ON
S3 : TAPE SELECTOR Fe – Cr – STD – Hi
S4 : TAPE SELECTOR CrO2 – METAL
S5 : REC MUTE OFF – ON
S6 : MIC/LINE SELECTOR MIC – LINE
S7 : PLAY OFF – ON
S8 : STOP OFF – ON
S9 : FF OFF – ON
S10 : REW OFF – ON
S11 : PAUSE OFF – ON
S12 : REC OFF – ON
S13 : ERASE PREVENT DETECTOR NOHOLE – HOLE
S14 : EJECT OFF – ON
S15 : POWER OFF – ON
S16 : TIMER REC/PLAY – OFF – PLAY

The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

Note;

- *This schematic diagram is applicable to serial numbers after ZL3600101.*


Q106,107,206,207,326 2SC1740LN – R or S or 2SC2634 – R or S
Q108,208 2SA825 – Q or R or 2SA564 – R or S
IC101,201 PA4005
IC101
IC201
IC301 BA843
IC501 BA658 or BA658EX
IC502 BA658 or BA658EX
VR102,202 DOLBY LEVEL ADJ C92 – 051
VR103,203 REC LEVEL ADJ C81 – 426
VR304 –20dB ADJ C92 – 048
VR501,502 0dB ADJ C92 – 049
Q111,211 2SC1815 – Y
Q112,212 2SA1015 – Y
Q109,209,110,210 113,114 ,213,214 2SC1740LN – R or S or 2SC2634 – R or S
D101,201,303,304 1S2473
D302,305 ~ 308 1S2473
Q315,317 ~ 319 2SC2060 – Q or R
D318,323,326,329 W03B or W03C
D313 ~ 317, 319 ~ 322,324,325, 327,328,330,334 ~ 339 1S2473
Q321 2SA825 – Q or S or 2SA564 – R or S
Q309 2SC790 – O or Y or 2SC1398NC – Q or R
Q320,322 ~ 325 2SC1740LN – R or S or 2SC2634 – R or S
Q327 2SC1740LN – R or S
ZD301 BZ – 050
ZD302 WZ – 250
ZD303 WZ – 056
D309 1S2473
D310 W03B or W03C
Q307 2SA825 – Q or R or 2SA564 – R or S
Q306 2SC1740LN – R or S or 2SC2634 – R or S
D311 S1VB10
Q308 2SD837 – Q or P
D312 S4VB10
T1 RTT – 207
AC POWER CORD RDG – 022
AC120V 60Hz
S15 POWER RSA – 039
S1 REC/PLAYBACK
S2 DOLBY NR
S3 TAPE SELECTOR
S4 TAPE SELECTOR
S5 REC MUTE
S6 MIC/LINE SELECTOR
S7 : PLAY
S8 : STOP
S9 : FF
S10 : REW
S11 : PAUSE
S12 : REC
S13 : ERASE PREVENT DETECTOR
S14 : EJECT
S15 : POWER
S16 : TIMER
S4 EJECT RSH – 054
S5 REC MUTE RSK – 060
S3 TAPE SELECTOR RSK – 058
S4 TAPE SELECTOR RSK – 059
S16 TIMER RSH – 051
S7 ~ S12 FUNCTION RSG – 088
S13 ERASE PREVENT DETECTOR RSN – 029
M: MOTOR RXM – 064
SL1 SL2,3 RXP – 083 RXP – 084
SL4 PU RXP – 085
D331 ~ 333 1K34A or 1N34A
LED701,702 PG5527SY
LED703 PR5527S
Q106 BASE
Q326 BASE
Q109 BASE
Q114 BASE
Q321 BASE
Q314 BASE
Q315 BASE
Q317 BASE
Q318 BASE
Q319 BASE
Q320 BASE
STOP
PLAY
REC/PLAY
REC/PAUSE
F.F
REW
OFF – ON
MIC – LINE
Fe – Cr – STD – Hi
CrO2 – METAL
PLAYBACK – REC
NOHOLE – HOLE
The underlined indicates the switch position.
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.